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Original Communications.

*RAILWAY SHOCK AND ITS TREATMENT.**

By F. X. Dercum, M.D.†

MR. PRESIDENT AND GENTLEMEN:—In making a choice of subject I was guided mainly by the consideration that an address before a body of medical men actively engaged in practice should be eminently practical in nature. Ere I have finished I think that you will agree with me that the subject of railway shock is one fraught with many practical questions, some of which bear an intimate relation to the routine of our daily lives, and which are important not so much because of the frequency of railway shock, but because of the valuable lessons which they teach. The theoretical aspects of the subject I shall be obliged to consider to some extent, but I propose doing so as briefly as the clear understanding of it will permit.

To many, doubtless, on first seeing the announcement of the title of this paper, "Railway Shock," the thought occurred that shock from railway injuries cannot differ in any essential point from shock produced by other

* Address delivered before the Ninth Annual Meeting of the Lehigh Valley Medical Association, August 16, 1889.

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causes. You will find, however, that the causation of railway shock is peculiar,—that its causation is composite, and that, therefore, the resulting condition presents special features. Certainly railway shock differs from ordinary traumatic shock, from surgical shock, and from purely emotional shock, and there is abundant justification for the use of the term.

Before proceeding, let us endeavor to obtain clear notions of shock itself. What is shock? What is its pathology?

Let us recall, to begin with, the classical experiment of Goltz. You will remember that he took a frog, placed him in an erect or vertical position, and then exposed the heart so that its pulsations could be readily studied. He then struck the abdomen a severe blow. Instantly the heart ceased beating, and only after a while did it resume its pulsations. The latter, too, were much weaker than before. Evidently the impression, the shock of the blow, had been transmitted to the nerve-centres, and thence, acting upon the heart, had caused it to become suddenly arrested and also for a time much weakened. Physiologists, as you know, express this phenomenon as one of reflex inhibition; but in whatever terms we state it, the cardinal point for us to recognize is, that it is one of sudden *cardiac paresis*.

The behavior of the heart, however, was not the only thing observed by Goltz. He noticed in addition that the blood, which had but a moment before distended the heart and vena cava, was gravitating into the abdominal veins, leaving the heart and its vessels practically empty. Evidently the same impression that had caused diastolic arrest of the heart had here caused paralysis of the walls of the abdominal veins, or rather of the vaso-motor system of nerves that control them; and we are now led to suspect that a general paralysis of the entire vascular apparatus is what really obtains in this form of shock. Indeed, among other things, this view receives ample confirmation from the elaborate sphygmographic studies of the pulse made in cases of shock by Furneaux Jordan,* the tension in the arteries being invariably very low. Again, it is extremely probable that even the capillaries are involved in this paralysis, for John Hunter† observed in a lady, whom he was bleeding, and who fainted during the operation,—and fainting is a kind of shock,—that the blood flowing from the vein, "instead of being dark and venous, was of a bright scarlet color, like that of arterial blood," a phenomenon which could only obtain provided the capillaries were much dilated.

Let us pause a moment and ponder upon the generalization we have just reached. The most salient feature of shock from a blow upon the abdomen is a general vascular paralysis. Evidently this means that the great vaso-motor nerve-centres have been paralyzed, and certainly it is in the highest degree unphilosophical to suppose that the effect of the blow is limited exclusively to these centres, or to attempt to explain all of the symptoms of shock by the mere vascular paralysis. It is known, indeed, as an absolute fact, that strong peripheral impressions will cause an abeyance of all the functions of the cord. S. Weir Mitchell has placed beyond all cavil the facts of paralysis from peripheral irritation,‡ and in dwelling upon the explanation of these strange phenomena, he quotes at length the conclusions of Morehouse, Keen, and himself, from which I extract the following pregnant sentences: "Either the shock of a wound destroys directly the vital power of a nerve-centre, or it causes paralysis of the vaso-motor nerves of the centre, with consequent congestions and alterations. *But there is no reason why, if shock be competent to destroy vitality in vaso-motor nerves or centres, it should be incompetent so to affect the centres of motion or sensation.*"§ Again, in speaking of various effects, quite common, the results of gunshot wounds, he says,‖ "These have been more or less vaguely treated of as shock, commotion, stupor, etc. The larger part of those who receive flesh wounds, involving no important organ, are but little affected at the time, or may even be unconscious of having been hit, and exhibit no well-marked immediate constitutional disturbance.

"In other cases, and particularly in wounds of graver nature, the patient instantly falls senseless, and so remains during a few minutes, or many hours, when he revives again, either completely, or to suffer from a continued state of depression known as the shock, and marked by the usual features of great weakness, feeble circulation, pallor, etc.

"In other cases the last-named symptoms

* Furneaux Jordan, "Hastings Essay on Shock, Surgical Enquiries." London, 1880.

† Cited by Lauder Brunton, "Shock and Syncope," p. 13.

‡ S. Weir Mitchell, "Paralysis from Peripheral Irritation" (*New York Medical Journal*, 1866, vol. ii. pp. 321 and 401).

§ *Loc. cit.*, p. 353. Italics in the original.

‖ *Loc. cit.*, pp. 403 and 404.

come on at once and without the intervention or accompaniment of unconsciousness.

"These very interesting states of the system may be due, it seems to us, either to an arrest or enfeeblement of the heart's action through the mediation of the medulla oblongata and the pneumogastric nerves, or to a general functional paralysis of the nerve-centres, both spinal and cerebral, or, finally, to a combination of both."

Again, he says, "A severe injury, as a gunshot wound of a limb or the neck, may produce its effects of unconsciousness and loss of power, by greatly weakening, or for a time destroying, with various degrees of completeness, the functions of all the nerve-centres and of their conducting cords." A little farther on occurs this significant paragraph: "The majority of physicians will, no doubt, be disposed to attribute the chief share in the phenomena of shock, in its various forms, to the indirect influence exerted upon and through the heart. There are, however, certain facts which, duly considered, will, we think, lead us to suppose that in many cases the phenomena in question may be due to a temporary paralysis of the whole range of nerve-centres, and that among these phenomena the cardiac feebleness may play a large part, and be itself induced by the state of the regulating nerve-centres of the great circulatory organ."

Mansell-Moullin, also, recognizes the general involvement of the nervous system, for he tells us that "shock is an example of reflex paralysis in the strictest and narrowest sense of the term,—a reflex inhibition, probably in the majority of cases general, affecting all the functions of the nervous system, and not limited to the heart and vessels only."* The word inhibition, however, mars this otherwise excellent definition. It implies that the various functions of the nervous system are suppressed or held in abeyance by some active agency, whereas the condition is, doubtless, one of simple loss of function, the result of violent molecular jar. To use a well-worn comparison, it is a loss of function similar to the loss of power in a magnet when the latter has been struck a violent blow. Not that I desire to give the impression that the nervous system must necessarily receive a violent mechanical jar, but merely a sudden profound and exhausting impression, whether the latter be a blow upon the stomach, the crushing of a limb, the wound of a nerve, or merely a violent mental shock.

Further, Groeningen† points out in the most conclusive manner that the vascular phenomena alone are utterly incapable of explaining the symptoms of shock, and attaches himself, with some minor reservations, to the theory of Leyden,‡ "that a powerful irritation, whether it impresses the cord directly, or indirectly through the mediation of a peripheral sensory nerve, provokes in it powerful (molecular) movements of the nerve-mass, and renders the same insensitive to the transmission of less intense excitations." Leyden includes in the resulting disturbances of function not only those of motility and sensibility, but also the action on the heart, on the vaso-motor nerves, and on the respiration. Groeningen, however, defines shock as "a fatigue or exhaustion of the spinal cord and medulla oblongata caused by a powerful sudden impression (insult)."§ This restriction of the field of shock-action to the cord and medulla appears to us to be most unphilosophical and entirely unwarranted. To what, for instance, is the paresis of the will, the general and profound mental anenergia, to be attributed if not to a participation by the cerebrum? Again, what becomes of the cases of shock due to mental influences alone, not to speak of shock (concussion) due to actual blows upon the head? Is it because the cardiac and vascular phenomena, the temperature phenomena, may be less marked in these latter instances, that they are to be excluded? If so, what becomes of the undoubted cases of *railway* shock,—a form of shock in which mental action plays so prominent a part? Surely, if the cord and medulla be capable of undergoing a suspension of function, due to violent molecular movements, the same must be true of the brain; true alike whether we have gross concussion or simple sudden exhaustion due to mental action alone. The fact that the various forms of cerebral shock—shock from emotion, shock from coarse vibratory jar, shock from actual trauma—form such widely different clinical pictures, cannot weigh against the truth of this proposition. That shock, having its point of departure, its focus of distribution, in the brain, should present special symptoms, must be expected on *a priori* grounds, and,

* Mansell-Moullin on "Shock" in "International Encyclopædia of Surgery," vol. i. p. 369, 1881.

† Groeningen, "Ueber den Shock." Wiesbaden, 1885.

‡ Cited by Groeningen, *loc. cit.*, p. 45.

§ *Loc. cit.*, p. 69.

further, that the symptoms should vary with the character of the impression also follows of necessity. It would be equally impossible to draw a distinction between the shock of the cord by a blow upon the abdomen or the concussion of the cord due to the impact of a bullet upon the vertebral column. The symptomatology is different in large part, but the principle is intrinsically the same. (See Leyden's view.)

Thus far, then, we have every reason to regard the symptoms of shock as referable to the nervous system as a whole. Further, we should expect on *a priori* grounds that certain symptoms, or groups of symptoms, should predominate, according to the part of the body by which the injury is received, and this, in a general sense, we find to be the case. For example, in shock from a blow upon the abdomen, vascular phenomena predominate; in shock from a blow upon the lumbar cord, spinal symptoms predominate (although vascular symptoms are also present); and in shock from a blow upon the head, of course, brain symptoms predominate. That shock of the cord does occur is known to every experimental physiologist, while the cases of Erb,* of Hunt,† that of Jordan,‡ and one lately placed on record by myself,§ show that it actually occurs in man.

Again, while the symptoms of shock are thus modified, according to the part by which the injury has been received, we must remember that it may be of all degrees of intensity, and that, therefore, individual cases injured in a similar manner may differ clinically. Further, the symptoms may be very much modified by the emotional state of the patient at the time of the injury. This fact and its importance we will presently realize. Again, as was pointed out by Jordan,‖ age is a modifying factor in shock. Children, other things equal, are less readily shocked than the middle-aged or the old. Lastly, the temperament of the individual, as has been recognized by all writers, exerts a powerful influence in determining not only the symptoms but also the occurrence of shock.

Let us now, in order that we may fully understand the subject, carefully rehearse the symptoms of simple severe shock. Let us take a case in which a powerful blow has been received, and let us suppose that the case has been observed *very shortly* after the occurrence of the accident.

We have, to begin with, profound, muscular weakness; secondly, a feeble, shallow respiration; thirdly, a feeble, slow, soft, almost imperceptible pulse; fourthly, great pallor of the surface; fifthly, great coldness of the surface; sixthly, a cold, clammy sweat. Examination further discloses that the sensibilities, both general and special, are blunted; that the will is weakened, if not altogether in abeyance; for the patient can only be stimulated to exert himself by repeated urging. In short, the whole picture is one typical of extreme depression.

I cannot do better, perhaps, in order to vividly recall this picture, than to cite the classical description of a case by Fischer:¶ "The patient, a strong and perfectly healthy young man, was struck in the abdomen by the pole of a carriage drawn by runaway horses. No serious injury was done to any of the internal organs, at least we have not been able, after a careful examination, to find any trace of one. Nevertheless, the grave symptoms and the alarming look, which he still presents, made their appearance immediately after the accident. He lies, as we see, perfectly quiet, and pays no attention whatever to anything going on around him. His countenance is sunk and peculiarly elongated, his forehead is wrinkled, and his nostrils dilated. His weary, lustreless eyes are deeply sunk in their sockets, half covered by his drooping eyelids and surrounded by broad dark rings. The pupils are dilated and react slowly to light. He stares, purposelessly and apathetically, straight before him. His skin, and such parts of the mucous membranes as are visible, are pale as marble, and his hands and lips have a bluish tinge. Large drops of sweat hang on his forehead and eyebrows. His whole body feels cold to the hand, and a diminution of temperature is readily detected by the thermometer, which indicates a degree and a half in the axilla and a degree Centigrade in the rectum below normal. Sensibility is much blunted over the whole body, and only when a very painful impression is made on the patient does he fretfully pull a wry face and make a languid, defensive movement. He does not move a single limb spontaneously; but, after being repeatedly and urgently requested, he

* Erb, "Ziemssen's Encyclopædia," American translation, vol. xiii. p. 349 *et seq.*

† Hunt, "Pepper's System," vol. v. p. 913.

‡ Jordan, *loc. cit.*, p. 39.

§ Dercum, "Remarks on Spinal Injuries" (THERAPEUTIC GAZETTE, May 15, 1889).

‖ Jordan, *loc. cit.*, p. 30.

¶ Cited by Lauder Brunton, *loc. cit.*, p. 3.

shows that he can still execute limited and brief movements with his extremities. If the limbs are lifted and then let go, they immediately fall as if dead. . . . . The pulse is almost imperceptible, irregular, unequal, and very rapid. The arteries are small and the tension very low. While the patient was being brought to the hospital, the pulse became quite imperceptible, and the cardiac sounds very irregular and intermittent. The patient is perfectly conscious: he replies very slowly and only when repeatedly and importunately questioned, but his answers are quite to the point. . . . He gave the details of the accident reluctantly and imperfectly, but in the main correctly. Only while he was being brought to the hospital did he refuse to answer at all. His voice is hoarse and weak, but his articulation is good. . . . His senses are perfectly acute. His respiration appears to be irregular, and abnormally long, deep, and sighing inspirations alternate with very superficial ones, which are scarcely visible or audible. While being brought to the hospital he vomited several times, and nausea and hiccough still remain. Any one who knew the patient, or had seen him shortly before the accident, could hardly recognize him now. His appearance, cold skin, and hoarse voice immediately recall the appearance of a cholera patient to the memory of the attentive observer; the characteristic dejections are alone wanting to make the resemblance complete."

In this graphic account you may notice that the pulse is spoken of as very rapid, while in the summary of symptoms I first gave it is mentioned as slow. That the pulse is probably always slow, as an immediate result of the accident, is shown by the observations of Jordan,* who, on making a special examination of the heart's action in forty-seven cases of shock from various causes, found it to be invariably slow. Jordan interprets the rapid pulse as a pulse of reaction. In this he is followed by most writers. By far the majority of cases of shock which we see are cases in which reaction has already begun, and in them we find, or are apt to find, a rapid pulse.

You will notice, also, that the senses, doubtless meaning the special senses, are spoken of as acute, while in our summary they are spoken of as dulled. It is very probable that this occasional sharpening of the special senses is also a symptom of reaction. This brings us to the discussion of the so-called erethistic form of shock.

Long ago Travers† distinguished from the form of shock we have been considering another, which he termed prostration with excitement, and which later writers have termed the erethistic form. Instead of lying absolutely quiet in the position in which they have accidentally fallen or been placed, the patients toss about wildly, complain loudly, say that they cannot breathe, act as though suffering the greatest agony, and frequently express their fear of impending death. They pay no attention to what is going on around them, being entirely taken up by their own suffering. Sometimes they are actively delirious. Their muscles tremble, and the breathing is rapid and short, now and then a deeper inspiration occurring. The pulse is rapid and soft. Instead of great pallor of the surface, the face is flushed, and the skin, instead of being cold and clammy, is at first hot and dry. But see what happens. "As the exhaustion increases the skin becomes covered with cold and clammy sweat, which is often very profuse. The face becomes pale and the expression haggard, the pulse innumerably rapid, irregular, fluttering; subsultus comes on; slight convulsions; coma more or less profound; and (it may be) death."‡ Evidently, then, the so-called erethistic form is at times only a precursor of the ordinary torpid form; and, as Lauder Brunton points out, "Patients recovering from the torpid form may come gradually to present the symptoms of the erethistic form."§ Without discussing the matter further, I am inclined to look upon the erethistic form as either a preliminary stage, or incomplete stage, of simple shock; or it is to be regarded as a stage of imperfect reaction from simple shock. I think with Groeningen, therefore, that this so-called erethistic shock is not to be considered as a separate form.

Having now formed a conception of shock in general, let us turn our attention to railroad shock in particular. Jordan, in speaking of general shock, recognizes four causes:‖

"1. Those which act on the corporeal organization.

"2. Those which act on the psychical functions.

* *Loc. cit.*, p. 45.

† Travers, on "Constitutional Irritation." London, 1827.

‡ Savory, on "Collapse" (Holmes's "System of Surgery," vol. i. p. 378).

§ *Loc. cit.*, p. 6.

‖ *Loc. cit.*, p. 8.

"3. Those which act on both the corporeal and the psychical functions in equal or unequal degrees."

4. Cold.

Without stopping to criticise the fourth cause, which, it seems to us, really belongs to the first,—namely, causes "which act on the corporeal elements,"—let us see under what head the causes of railroad shock are to be sought.

A moment's reflection will convince us that the causes of railway shock may be found under any of the first three of Jordan's divisions.

A railway accident may ensue in such a way that the subject of it receives a violent trauma, with instantaneous loss of consciousness, and the shock, then, is the result purely of the corporeal impression. Secondly, it may occur in such a way that the subject receives no physical injury whatever, but merely suffers from an intense psychic impression. Thirdly, the subject may suffer from a combination of both these causes; and this includes, indeed, the vast majority of cases of railway shock. Jordan tells us that "the principal feature in railway injuries is the combination of the psychical and corporeal elements in the causation of shock, in such a manner that the former, or psychical element, is always present in its most intense and violent form. The incidents of a railway accident contribute to form a combination of the most terrible circumstances which it is possible for the mind to conceive. The vastness of the destructive forces, the magnitude of the results, the imminent danger to the lives of numbers of human beings, and the hopelessness of escape from the danger give rise to emotions which in themselves are quite sufficient to produce shock, or even death itself. Syncope, or concussion of the brain, may destroy consciousness for a time, or possibly altogether; but if consciousness return, depressing influences still operate, although less injuriously, but on a blunted nerve-power. All that the most powerful impression on the nervous system can effect is effected in a railway accident, and this quite irrespectively of the extent or importance of the bodily injury. Indeed, if there be no bodily injury whatever, the shock may, nevertheless, be intense, and be followed by ulterior results, the nature and mode of termination of which it may be difficult to foresee. With the fullest extent of mental shock, the extent of bodily injury may vary greatly, from an abrasion of the skin to the crushing of the body into a shapeless mass."*

We can fully understand, then, that sequelæ of the most persistent and distressing kind should result from railway shock. The sudden, excessive, exhausting discharge of nervous energy in the excitement, the fright, the horror of the moment, must certainly result in a general weakness more or less marked, more or less enduring. That such a condition does result is a matter of daily clinical experience. It was fully recognized by Jordan, who termed it chronic shock or chronic asthenia, while later writers have termed it traumatic neurasthenia.

If we add to this the fact that in railway accidents the trunk and head are particularly liable to injury, that the body, as a whole, is apt to be "thrown violently into contact with surrounding objects," and that brain or cord symptoms are correspondingly present, we are at length in a position to appreciate what is meant by "railway shock;" and the subject assumes still deeper significance when we are brought face to face with the fact that degenerative processes, actual organic changes, may occur in the nervous centres themselves.

Recognizing, then, that railway shock is made up of two elements,—physical and psychic,—we can readily understand that in any given case the symptoms will vary according as the one cause or the other predominates. As Page and other writers before him have pointed out, shock from purely mechanical injury, such, for instance, as the crushing of a limb, is relatively short, and not, as a rule, followed by symptoms of general nervous disturbance, while shock from purely psychic causes is usually very persistent. Page† says, "It is a seemingly anomalous and most noteworthy fact that the collapse which in these railway accidents accompanies serious bodily injury, such as severe laceration of limb or fracture of bones,—always excepting the collapse from severe concussion of the brain,—is not followed, or is, indeed, very rarely followed, by the train of after-symptoms indicative of general nervous shock. This is a fact of the greatest interest and importance, and one which will help to throw light upon those symptoms of general

* *Loc. cit.*, p. 37.

† Page, "Injuries to the Spine and Spinal Cord." London, 1883, p. 150. That this does not always hold good is shown by two cases reported by Knapp, "Nervous Affections following Injury" (*Boston Medical and Surgical Journal*, November 1 and 8, 1888; Cases XI. and XII.).

nervous shock which are so often seen after the slighter degrees of initial collapse." As an example of the persistence and the kinds of symptoms presented by cases in which the psychic cause largely predominates, Page cites* the case of a tall and powerful man, aged 46, who "was in a very severe and destructive collision. He received bruises over both arms and legs, and also a blow upon the face, which abraded the skin over and fractured the bones of the nose. He was not stunned. He lay for several days after the accident in a state of great nervous depression, with feeble and rapid pulse, and inability to eat or sleep. He suffered at the same time much distress from the fact that a friend, sitting beside him in the carriage, had been killed, and this seemed to prey constantly on his mind. The bodily injuries progressed rapidly towards recovery, and in seventeen days after the accident he was able to be moved home. Nine weeks after the accident he had fairly recovered from his injuries, and made no complaint of bodily sufferings. The ordinary functions of the body were natural, but his mental condition showed extreme emotional disturbance. He complained that he had suffered continuously from depression of spirits, as if some great trouble were impending. He feels very upset at our visit, and begins to cry. . . . His voice is very weak and indistinct, and occasionally, he says, it is almost inaudible. He sleeps very badly, waking frequently, and being constantly troubled by distressing dreams. His pulse is weak, 104. . . . Words, in fact, fail adequately to portray the distressing picture which this otherwise strong and healthy man presented." Subsequently he underwent a slight and gradual improvement, but four years afterwards his medical attendant wrote that "his appearance was much altered, that he looked older, haggard, and that he had become very bald, that he was very depressed, sometimes had palpitation, loss of sleep, bad dreams, very easily tired, had lost all his energy, and was easily upset."

An interesting case of this form of shock was recently studied by myself. A gentleman, accompanied by his wife and child, started to spend a two weeks' vacation at one of the smaller resorts along the New Jersey coast, and to reach which it was necessary to change cars at a small way-station. The party alighted in safety on the platform of this station, which was raised a few feet above the level of the surrounding ground. It so happened that attached to the rear of the train were several freight-cars filled with railroad-ties, which laborers were unloading at various points along the road. During the stop made at this way-station a number of ties were likewise thrown off. One of them, however, had become so jammed into the body of the pile that the laborers, during the short time allowed, could not disengage it, and it was left jutting several feet beyond the side of the car. The train being started, this tie swept the platform on which our passengers had alighted, like a scythe. The husband, who was now at a little distance from his wife and child, was the first to perceive the danger. He cried out to his wife to lie down, while he himself jumped for his life. His wife obeyed, but as she did so she saw her child, a little girl of 6, struck full in the abdomen and shockingly injured. She herself escaped all physical injury, but became at once uncontrollably excited and hysterical. She remained in this condition, with but little change, for three weeks, when, being three months pregnant, she miscarried. Subsequent to this she gradually improved, but she was evidently a very much changed woman. A year after the accident she was still very neurasthenic. From having been of a bright and cheerful disposition she became depressed and melancholic. Her color, too, was now habitually pale and of a very sallow tinge. She was exceedingly nervous, weak, and irritable, and utterly incapable of managing her household. Her pulse was weak and rapid, and her knee reflexes sluggish. Her back was painful, and superficial tenderness was discovered over the lumbar region. Her grip was decidedly tremulous. Regarding the miscarriage, it should be stated that though she had been a number of times pregnant, no miscarriage had ever occurred before. She had always, though of an admittedly nervous temperament, enjoyed good health.

Various instances might be cited, if time permitted, in which neurasthenia and hysteria, more or less marked, and even actual insanity, resulted from shock.

Page attempts to explain the marked difference between the sequelæ of shock from gross mechanical injury and shock from psychic causes by saying that in a case, for instance, of a broken leg, the patient has a definite injury on which his mind may dwell and the progress towards recovery of which he daily sees. Further, the enforced rest is

* *Loc. cit.*, p. 151.

beneficial, and, the injury being definite, "there is less likelihood of a dispute arising as to compensation." That these considerations are, however, not sufficient in themselves to explain, on the one hand, the absence or short duration of the symptoms of nervous shock, or, on the other, their long-continued existence, is vaguely recognized by Page himself, for he even resorts to the remarkable expedient of blaming bromide of potassium for the protraction of the symptoms!

It may be that in the present state of our knowledge no perfectly satisfactory explanation can be given. However, may it not be that in shock from severe bodily mutilation, the very depth and intensity of the process renders the nervous system insensitive to the psychic impressions, just as a nerve, other things equal, already exhausted by one stimulus, is insensitive to others? Remember that a man whose limb or whose trunk is crushed in a railway accident, is hurt, as a rule, suddenly and unexpectedly,—*i.e.*, before he has time to realize what is about to happen, or has happened,—and that the very reception of his injury and the sudden oncoming of collapse makes the additional psychic shock impossible. Remember the picture of extreme anenergy, both mental and physical. Remember the torpor motor and sensory, and you will realize that here the additional factor of emotion can play no *rôle*. Certainly this explanation is in harmony with the facts. Why the sequelæ of psychic shock should be so persistent does not concern us. It is simply the fact with which we have to deal.

Further, how serious and profound purely psychic shock may be is illustrated by a case related by Lauder Brunton, and which is so interesting that I may be pardoned for quoting it. "Many years ago the janitor of King's College, Aberdeen, had rendered himself in some way obnoxious to the students, and they determined to punish him. They accordingly procured a block and axe, which they conveyed to a lonely place, and, having dressed themselves in black, some of them prepared to act as judges, and sent others of their company to bring him before them. When he saw the preparations which had been made he at first affected to treat the whole thing as a joke, but was solemnly assured by the students that they meant it in real earnest. They proceeded to try him, found him guilty, and told him to prepare for immediate death, for they were going to behead him then and there. The trembling janitor looked all around, in the vain hope of seeing some indication that nothing was really meant, but stern looks everywhere met him, and one of the students proceeded to blindfold him. The poor man was made to kneel before the block, the executioner's axe was raised; but, instead of the sharp edge, a wet towel was brought smartly down on the back of the culprit's neck. This was all the students meant to do, and, thinking that they had now frightened the janitor sufficiently, they undid the bandage which covered his eyes. To their astonishment and horror, they found that he was dead."* Surely no mechanical shock ever killed more surely or more swiftly.

Another interesting case is related by Baunis.† A farmer, accompanied by a number of Arabs, had set out to kill a panther, which was making the farm insecure. Barely had he fired a shot before the panther leaped upon him and seized him in his claws. The bullets of the Arabs, however, immediately despatched the animal, and thus liberated the farmer. The latter was removed to the lazaret. Baunis discovered several scratches on the shoulder which might have been grasped by one of the animal's paws. The scratches were entirely superficial and had hardly bled. However, the patient was in a condition of deepest prostration. Face pale, skin cold. He was fully conscious, but was suffering from the indescribable impress of the fright he had received. Baunis in vain made use of stimulants and of moral persuasion; the next morning the unfortunate man was dead. At the autopsy no traumata whatever of the abdominal or thoracic cavities, nor of the central organs, were found. The injury of the shoulder proved to be entirely superficial, and had not involved the joint.

Page‡ cites two fatal cases the result of railway collision, and they are especially interesting from the fact that death was delayed for several weeks. The first was that of "a man 40 years of age, of exceedingly delicate physique, who was in a collision at night. The accident was a slight one, and he was the only passenger injured. He was said, in the official report, to be 'violently shaken,' but he was able to go on home. The next

* Lauder Brunton, *loc. cit.*, p. 8.
† Cited by Groeningen, *loc. cit.*, p. 137.
‡ *Loc. cit.*, p. 168.

day he was delirious, and on the third day he was still talking somewhat incoherently. He complained of being much shaken and feeling seriously injured, but there was no evidence discoverable of bodily hurt. He improved for a time, and his condition was not thought to be serious. He never seemed, however, to make any marked progress, and four weeks after the accident he became more prostrate, and greater anxiety was felt about him. From this time he gradually got weaker and weaker, and died on the thirty-seventh day. No organic disease whatever was found on post-mortem examination in any of the viscera.

The other case was that of "an apparently strong and healthy girl, 19 years of age, in good position in life, who was in a most serious collision. She received no bodily injury, but on the night of the accident she woke screaming that the engine was rushing into the room. Her illness followed much the same course, and she died in about five weeks, no structural disease whatever being found after death. The brain and spinal cord were examined in both instances."

Again, some years ago, there was brought to the nervous clinic of the University a child of 4 years, in which marked imbecility and permanent loss of speech had followed a fright by a drunken man. Professor H. C. Wood is in the habit of relating to his class a similar case, in which loss of speech and epilepsy followed a protracted ride in a railway-car, the child being the while in a perfect paroxysm of terror. Cases such as these are certainly very significant as indicating actual organic changes as the result of psychic shock.

Having now formed an idea of psychic shock and its possible *rôle* in railway accidents, let us turn our attention briefly to the physical shock that may be received, and determine whether the latter is always the transient affair that many writers would have us believe. In many cases it is impossible to separate the two elements of shock, and also to estimate such complicating factors as loss of blood. However, in the instance of simple and uncomplicated direct shock (concussion) of the cord, the symptoms can be readily studied, and these cases we shall use as illustration.

That the cord is actually the subject of shock I need hardly repeat. Despite its deep situation and despite its elaborate protection, it is known to suffer severely from blows upon the spinal column. That temporary concussion of the cord—*i.e.*, transient arrest of function—can occur is indubitably proved by the cases of Hunt,* in one of which a bullet had lodged against a vertebra, but without in any way injuring the spinal canal, and, in the other, the cord had been shocked by a fall upon the feet. In both cases the ensuing paraplegia was transient. The case reported by Jordan† proves that shock to the cord may in every way be as fatal as shock to the brain. The case was that of a man who had "discharged a pistol into his mouth and imdiately died. Examination of the body showed that the bullet struck the body of the second cervical vertebra; but, beyond slight laceration of the tongue and of the upper part of the larynx and pharynx, no injury was done; no vertebra or any other bone was broken. The naked eye could detect no change in the upper part of the cord or the membranes."

Further, that shock to the cord is *not always* a transient affair is shown by a case already placed on record by myself;‡ and, secondly, that permanent changes in the cord occur as a result of spinal concussion is ably maintained by Gowers,§ who, in addition to cases in which hemorrhage into the membranes, or into the substance of the cord, occurs, recognizes also those cases in which "no lesion of the cord has been found, either with the naked eye or the microscope, a few days after the injury." Further, he tells us, that "in other instances, in which the cord is examined some weeks or months after the accident, the signs of chronic myelitis are found, in scattered foci or more diffuse tracts, in the white columns or gray substance." He cites the case of a lady who was merely shaken in a railway collision, who, in a few days developed paraplegia, and in six weeks was dead, and in whom a post-mortem examination revealed "indications of subacute myelitis, chiefly in the white columns, varying in its extent in different regions, but in most parts considerable in the pyramidal tracts." Edes‖ also records four cases of degeneration in the postero-lateral columns of the cord, the result of spinal concussion, and in one of these cases determined the actual existence of the lesion by an autopsy. Similar results were reached

* *Loc. cit.*

† *Loc. cit.*

‡ Dercum, *loc. cit.*

§ Gowers, "Diseases of the Nervous System." Philadelphia, 1888, pp. 435–437.

‖ Edes, *Boston Medical and Surgical Journal*, September 21, 1882.

by Duménil and Petil,* and Spitzka† also states that shock and injury are among the causal factors of both posterior and disseminated sclerosis. Other writers are also in harmony with these views.

While some of the cases of organic disease of the cord following blows upon the back are due to intramedullary hemorrhage, and others to small foci of inflammation, others still appear to be due to a simple degenerative process, just as though the vitality of various tracts had been permanently affected by the concussion.

We have considered thus far, though briefly, the elements that enter into railway shock, as well as some of the sequelæ. Let us now turn our attention to treatment. What we have thus far considered will now be found to have more or less practical significance.

The treatment of railway shock, as well as of shock in general, naturally falls into two subdivisions, — first, the treatment of the stage of shock itself; and, secondly, the treatment of its sequelæ. In the treatment of the stage of shock itself two objects must be born in mind,—first, the averting of actual death and the production of a healthy reaction; and, secondly, the averting, if possible, of either functional or organic sequelæ.

How, then, shall we treat a case of profound general shock?

Let us remember that the symptoms of shock are essentially paralytic in their nature. Let us recall for a moment the feeble, almost imperceptible pulse, the feeble respiration, the cold, clammy surface, the extreme pallor, and the profound muscular weakness. The first thing that occurs to us is the use of a cardiac stimulant, and in all times alcohol has been used for this purpose. Whiskey, and preferably whiskey to which hot water has been added, is to be given, if possible; but, it may be, either because the patient is vomiting, or by reason of the very depth of the shock itself, no decided effect is produced. Ammonia, in its various preparations, also suggests itself; but, for like reasons, its effects may be inappreciable or altogether transient. A powerful remedy, however, we have in digitalis. Lauder Brunton‡ suggests its use in shock, basing his opinion upon the case of Wilks, in which shock followed labor, and in which recovery ensued on administering tincture of digitalis in ½-drachm doses every half-hour. That in digitalis we have a most valuable remedy there can be no doubt, and that in urgent cases it should be used in large doses, if at all, is equally true. It has the additional advantage of being readily administered subcutaneously, and, with proper care, can thus be given with great accuracy. Ten to twenty minims of the tincture, slightly diluted, can be injected at short intervals until some effect is noted upon the pulse. Further, atropine administered in the same way, in small doses and not too frequently repeated, may also be used to the same end, this drug being, as we know, a stimulant to the circulation, and notably to the vaso-motor centres.

However, we must remember that shock affects the nervous system as a whole, that not *one* system of centres but *all* are affected, and that, therefore, some remedy, more general in its action, should be employed. Such a remedy we have in strychnine. I have for some time past regarded strychnine as one of the remedies of the utmost importance in shock. Mansell-Moullin§ and Groeningen‖ both recognize its value, especially the latter. Certainly, in profound shock—the shock that threatens to be fatal, shock that refuses to yield to other measures—strychnine should be given subcutaneously, and, if necessary, in massive doses. In extreme cases, I should not hesitate to use it in doses of $\frac{1}{15}$, or even $\frac{1}{8}$, of a grain. On *a priori* grounds alone, the remedy must be regarded as of the utmost value, for by no other means can the nervous system be so profoundly impressed, so rapidly re-energized. It is strange, indeed, that it has been not more frequently resorted to.

While these thoughts are passing through our minds, we must not forget that our patient is cold, cold even unto death, and that artificial heat is one of the very first desiderata. This heat can be supplied by cans or bottles of hot water, or other heated objects. The best of these means, however, meet the indications but imperfectly. The late Dr. Hunter, of Philadelphia, suggested the use of hot baths, but even these threaten to exhaust the almost dying patient by the unavoidable handling. Recently, in a case of collapse, occurring in a child during the course of a pleurisy, and in which the temperature fell to 96.5°, I caused an ordinary hospital waterbed to be filled with hot water, and, having

* Duménil et Petil, "Commotion de la Moelle Épinière" (*Archives de Neurologie*, 1885, vol. ix. pp. 1, 145, 307).

† Spitzka, "Pepper's System," vol. v.

‡ *Loc. cit.*, p. 17.

§ *Loc. cit.*, p. 373.

‖ *Loc. cit.*, p. 232.

covered it with several layers of flannel blankets, placed my patient upon it. The result was gratifying in the highest degree, the temperature of the body soon rising to a little above normal.

Evidently this expedient meets every indication. Not only have we a large amount of heat applied to a very large surface of the body; but, what is very important, it is *dry* heat. Certainly, by no other means can the temperature of the body be so readily influenced as by the *hot*-water-bed.

Further, there can be no doubt that sinapisms to the epigastrium, and large enemata of hot coffee, are also conducive to reaction. The subcutaneous injection of ether is, likewise, also beneficial, though, in the cases in which I have seen it used,—namely, collapse during abdominal operations,—it seemed to act rather as local irritant, and thus stimulating the heart in a reflex way.*

We must remember, above all things, that our patient must be kept in an absolutely horizontal position, with the head rather lower than the trunk, that he must not be moved about or lifted unnecessarily, and that all manipulations, except such as are absolutely necessary to determine the condition of the circulation, the respiration and the temperature must be avoided. Very rarely, indeed, attempts at artificial respiration may be justified, or friction of the limbs, the direction being always towards the trunk, may be admissible. In the main, however, our patient will be most benefited if let alone.

Regarding such measures as transfusion of blood, the course pursued must depend on in how great degree the symptoms are due to loss of blood alone; but, at best, I consider this means as of questionable utility. As regards the opposite expedient,—that of bloodletting,—it needs but to be mentioned to be condemned, notwithstanding the recommendation of Savory to open the external jugular!†

Of the various measures, then, at our command for treating a case of shock, whiskey and dry heat should first be employed; secondly, our case being at the outset very threatening, a full dose of strychnine should be given hypodermically,—say $\frac{1}{10}$ of a grain. Following this, digitalis and atropine may be used. Repetition must be guided by the deepening of the collapse.

In shock with restlessness and excitement—that is, the so-called erethistic form—there is a strong temptation to the use of sedatives. No one, however, fully cognizant of the true nature of this state, can shut his eyes to their danger. The bromides, for instance, in small doses, are inefficient; in large doses, depressant. Chloral, on the other hand, may give us sleep, but it will be at the expense of still further weakening the heart. How is it, you ask, with opium? Travers, Savory, and Jordan each speak in favor of its use,—that is, with qualification. It is like a two-edged sword; it may in one instance quiet our patient, produce a restful sleep, and in another may overpower his already weakened nerve-centres. If used at all, it should be used in small doses, administered hypodermically, and repeated, if at all, with caution. On the whole, I regard it as a remedy rather to be avoided than courted. Travers speaks favorably of hyoscyamine, as does also Savory, and certainly this drug deserves a more extended trial.

I believe, however, that in the erethistic form of shock, in addition to the various measures employed in simple shock, we have no more valuable remedy than musk. Unfortunately, it can only with difficulty be obtained, much of that dispensed in its name being practically inert. However, should the remedy be at our command, it should be freely administered, in doses say of 15 grains, and preferably by the rectum. Its action in soothing, quieting, and steadying the nervous system is undoubted. Should musk be inaccessible, valerian might be employed, in large doses, of course, in its stead, but with much less promise of success. Better still, hops, in the form of the fluid extract, a drachm or more, may be administered.

You are to remember, however, above all things, that, as in the simple form of shock, needless interference with the patient is to be avoided, and that it is better to err in doing too little than attempting too much.

The individual judgment of the physician must always guide him in the selection of his remedies in any given case. Rest alone will in some cases in due time be followed by reaction. In others, again, a dose of whiskey, or, possibly, whiskey to which a small dose of morphine has been added, will give the most gratifying results. In others, still, the depression may be so great that

* There can be no doubt that in shock, as elsewhere, the inhalation of ether—*i.e.*, its cautious and sparing administration—acts very much as does alcohol, namely, as a stimulant. This is, I believe, in harmony with the experience of surgeons. Chloroform in shock is, of course, to be rigidly tabooed.

† *Loc. cit.*, p. 383.

the prompt application of external heat, and the various other powerful remedies already detailed, may be required. No fixed rule can be given; the indications must be met as they arise.

Let us suppose, now, that the stage of shock itself has been successfully combated. Let us suppose that our case has been one of railway shock in which the psychic element has played a prominent part, or that it is one of those cases in which powerful blows have been received upon the trunk or upon the back. We will remember at once how frequently psychic shock is attended by persistent sequelæ, not to speak of those more rare cases in which death itself follows after a time. Further, we recall the fact that permanent spinal symptoms, actual organic cord changes, may follow blows upon the trunk. What, then, shall be done, what measures shall we adopt, to meet these possibilities?

Evidently the state of rest must be prolonged,—prolonged far beyond the apparent needs of the patient's condition. All the time we should be on the alert for symptoms indicative of chronicity, and by all means in our power combat them. Surely the neurasthenia and the profound hysteria that occasionally ensue upon shock demand rest, and the sooner it is given them the better; and, in those cases in which shock of the cord is suspected,—in which, it may be, organic changes have been set up,—absolute rest is likewise indispensable. In other words, I believe that every case of railway shock, if at all severe, should at once be submitted to a rest-cure based upon the Weir Mitchell method. In such cases, whether mental or spinal, absolute rest, isolation from friends, forced feeding, massage and electricity should be the order of the day.

Even with these precautions cases in which the sequelæ are delayed would escape us; but "better late than never" should be our motto, and the rest-cure should be adopted whenever the sequelæ are detected.

The benefit of a careful watch over railway cases can be no better illustrated than those in which subsequent vertebral disease leads to paraplegia, and in which interference at an early day may avert this unfortunate result. This field, however, does not belong to to-day's discussion, and I merely mention it because it is not improbable that organic cord-changes dependent upon shock may be arrested, or at least delayed, by active measures taken in time.

The further consideration of this important subject, which can hardly be condensed into a brief address, and which I feel I have dealt with but imperfectly, I leave now to yourselves.

THE OPERATIVE TREATMENT OF SPINA BIFIDA.

By E. P. Hurd, M.D.

I.—CLINICAL REPORT.

Lumbo-Sacral Spina Bifida—Aspiration, then Excision of Sac—Ligature of Neck of Sac—Approximation of Deep and Superficial Parts with Catgut under Antisepsis—Recovery.

THE operation which I am about to describe is a sufficiently rare event in surgery to warrant me in giving the history of the case somewhat at length.

In September, 1888, Mrs. S. G. B., then residing in Concord, Mass., brought to my office her infant child, then 7 months old, to consult me with reference to a congenital swelling situated in the lumbo-sacral region. This tumor, entirely covered by the skin, which seemed normal, though at one spot thin and shiny and traversed by arborescent bluish veins, was then about the size of a large orange; it was situated exactly over the middle line of the trunk, was soft, elastic, fluctuating, was roundish, much the shape of a bowl, though slightly bulging, and terminating in a pyriform point on the left side. Here the skin was thin, as if in danger of bursting. This tumor seemed to be connected with the bony substance beneath by a large base, and could not be moved to either side from this attachment. Firm pressure failed to cause the least diminution in volume, nor did the cries or movements of the child in any degree change its size.

It was not possible by manipulation to detect any loss of substance in the vertebral arches, through which this swelling might have communication with the spinal canal. Directly over the central axis of the tumor was a thickened patch of skin. Had I duly weighed the importance of this sign, on which Duplay strongly insists, I could have had no doubt as to the diagnosis of meningo-myelocele. Virchow has shown that over the point of insertion of the caudal extremity of the cord there exists almost always a depression of the surface of the tumor, or a distinct patch, due to local thickening of its walls.*

* Duplay, "Leçons de Clinique Chirurgicale," Part II., 1879, p. 269.

The child, a girl, was well developed and strong; had never had any trouble of motility or sensibility; presented nowhere any discernible vice of conformation. The mother had had a normal pregnancy, and had always possessed fair health.

The diagnosis was somewhat obscure, but there seemed to me warrant for the opinion that this was a case of spina bifida, of the variety known as meningo-myelocele, with a very small foramen of communication with the spinal canal. With a hypodermic needle I drew off some of the liquid of the sac; it was clear and thin as water; did not coagulate under heat. One of the characteristics of the fluid of these hernial sacs is that it contains scarcely a trace of albumen, and a very minimum proportion of salts such as chloride of sodium and phosphates. On the other hand, it sometimes has a small quantity of urea or grape-sugar. It thus differs from all other secreted liquids. I was doubtful about the expediency of any operation except that of Morton, to which the parents did not then accede. I advised that a hollow truss of chamois leather be worn to support the tumor.

This case did not again come under my observation for several months. The parties meanwhile moved from Concord to West Newbury. During January, 1889, the little patient was again brought to my office. The tumor had increased somewhat in size, the bulging at the lower left inferior angle was still more marked. The subject of operative treatment was discussed, but nothing definite was decided upon.

An alcoholic sublimate lotion was prescribed to toughen the integument, and a well-padded chamois-leather-bag truss was adjusted to support the swelling. The tumor was becoming very inconvenient, besides being somewhat of a deformity.

September 4, 1889, I visited the little girl with my friend, Dr. G. W. Jones, of Cambridgeport, Mass. The tumor was then about the size of a quart bowl; it covered the sacral region as far down as the cleft of the buttocks. The child was then 17 months old, was able to walk and run, and seemed vigorous. Dr. Jones was inclined to regard the swelling as nothing but a simple cyst, entirely unconnected with the spinal cord or canal, and advised immediate removal.

It was arranged that the child should be brought to the Anna Jaques Hospital, Newburyport, on the 5th inst. It was decided that we should first aspirate the tumor, that we might the better determine its nature and the kind of operation to be performed.

September 6, the child was brought to the Anna Jaques Hospital. The swelling was aspirated in the most dependent portion, and all the liquid contents withdrawn; the whole amount was a pint and a half. The liquid was thin and as clear as spring water. At the place of puncture the skin was almost as thin as paper. The sac must inevitably soon have burst. The child became quite pale and weak from removal of so much fluid, but manifested no particular restlessness. In half an hour she took her bottle with the usual avidity, and seemed fast rallying.

After collapse of the sac, an examination was made. There was nothing to indicate that the swelling was necessarily anything but a simple cyst, and it was decided to cut down on the sac and dissect it out. The parents, with much hesitation, gave their consent.

Ether was administered, and a linear incision made over the tumor, freely exposing the inside of the sac. To my consternation I saw the nerves forming the cauda equina spread over the surface of the white, shiny membrane constituting the sac, and, passing my finger along this membrane, it sank into an indentation caused by a loss of substance in the arch of the last lumbar vertebra; the spinous process, in fact, seemed to be absent. A small foramen was visible at this point, and a probe was easily passed through it into the spinal canal.

I was too familiar with Gross's condemnation of operative interference in cases of true spina bifida to have courage to continue an exsection which might end in the death of my patient, and bring upon me the lasting reproach of a whole family, so much attached to the child. Besides, I fancied that I saw a menace of convulsions and sinking. We hastily removed a considerable portion of the surplus integument with the sac, and brought the edges of our incision together with a continuous catgut suture, over the whole painting flexible collodion. A compress and bandage were next applied, and the child was allowed to come out from the influence of the anæsthetic.

Tuesday, September 10, I was hastily summoned to the house on Boardman Street, where Mrs. B. was stopping with her child. The report that came to me was that the sac had refilled and had burst. Apparently about a pint of liquid had drained away through a loss of continuity, due to a giving way of one

of the catgut stitches. The child was somewhat pale and weak; otherwise had sustained no harm.

A consultation was held with Dr. G. W. Jones, and it was decided that there was now nothing to do but complete the operation which we had commenced on the 6th. It was certain that the sac would keep on secreting, and that we could not stop its leaking. This would soon enfeeble the child beyond the ability to rally. The injection of an irritating liquid (like Morton's solution) seemed to offer a forlorn hope by the side of a more radical operation which should remove the secreting membrane, and close up the wound in such a way that perfect soldering together of the raw surfaces—the deep and superficial parts—would be inevitable.

The case was submitted to the parents, who were made to understand that in our judgment there was no other operation which gave a reasonable hope of saving their child's life. If they were disposed to blame me for the incision of the previous day (Friday), which had now put their child's life in such jeopardy, they should bear in mind that the inevitable tendency of the case, as it had been progressing for many months, was towards sloughing and rupture, and the thinness of the sac at its most dependent portion showed that this event must soon have taken place.

The consent of the parents was readily obtained to the operation upon which we were now decided.

Wednesday, September 11. Ether was administered, and the operation was performed under thorough antiseptic precautions. Once during the operation it was deemed necessary to rally the failing heart by a hypodermic injection of ether. The line of incision made on Friday was opened up, and the cavity sponged out with a sublimate solution (1–2000). The glistening sac, with its arborescent nerve-filaments and median core, was dissected or torn from its subjacent tissues, till we had the entire membrane in our hands down to the foramen of entrance into the vertebral canal. Behind the neck of the sac (and by this term I mean the constricted portion before mentioned, where the sac passed up into the spinal canal) was a large pulsating artery, which we carefully avoided. A stout catgut ligature, which had been previously well chromicized to make it more enduring, was passed around the neck of the sac and twice firmly tied, then the entire sac was excised; iodoform was freely dusted over the raw surfaces, and a continuous fine catgut suture was taken, attaching the deep layer of the skin in front to the fascia which had constituted the posterior boundary of the sac; this running blind-stitch was entered from above and below till it finally ended in the edges of the cutaneous flaps, which were also brought together by a buried catgut suture; iodoform was applied once more, and the line of incision finally closed in with flexible collodion. A compress and bandage completed the operation. Dr. G. W. Jones rendered me most important assistance by his superior surgical tact.

It will be seen that the above was strictly a hernia operation, performed according to Marcy's methods, as described in his recent treatise on "The Radical Cure of Hernia,"* published by G. S. Davis, Detroit. The sac with its contents originally belonged to the spinal canal, and had become a hernia by protrusion through a weak place in the last lumbar arch. This foramen of exit corresponded to the abdominal ring which gives passage to intestinal hernia.

The ligature of the sac by chromicized catgut is according to Marcy's plan of dealing with the sac of abdominal hernia, and the stitching of the deep and superficial parts together by a running catgut thread, and the final closure of the cutaneous incision with catgut and collodion is also like the abdominal operation.

The subsequent progress of the case has been most gratifying. To-day (September 16), the sixth day after the operation, the wound is fast healing, and the child has nearly recovered its strength. At the former site of the sac, where the bulging was greatest, there is now a cup-shaped concavity, and the foramen of exit seems filled by plastic exudation. All inflammatory action has subsided. The child was restless during the first two or three days. This restlessness was calmed by the free administration of wine and 5-grain doses of sulphonal at night; the latter produced quiet sleep. I should have remarked that the operation was immediately followed by considerable collapse, which, however, soon subsided under brandy and external heat.

With regard to the large quantity of liquid abstracted from the sac (certainly more than a quart in less than a week), I cannot think that this was chiefly cerebro-spinal fluid, but rather a secretion from the sac itself. This

* "The Radical Cure of Hernia," Leisure Library Series, 1888, G. S. Davis, Detroit.

was proved by the rapid refilling of the sac after aspiration. The quantity of cerebro-spinal fluid in the cavity of the arachnoid in the normal state is but a few ounces.

II.—GENERAL CONSIDERATIONS ON HYDRORACHITIS.

According to the report of the London Committee on Spina Bifida (1885), the term "spina bifida" is used to define certain congenital malformations of the vertebral canal with protrusion of some of its contents in the form of a fluid tumor. With very rare exceptions, the malformation affects the neural arches of the vertebræ, and the tumor projects posteriorly. Three varieties are given: 1. Protrusion of membranes only (simple meningocele); 2. Protrusion of the membranes, together with the spinal cord and its appertaining nerves (meningo-myelocele); 3. Protrusion of the membranes, together with the spinal cord, the central cavity of which is dilated so as to form the sac cavity, the innermost lining being constituted by the expanded and atrophied substance of the cord (syringo-myelocele). Meningo-myelocele is far the most frequent, while simple meningocele comes next, and syringo-myelocele comes last.

Spina bifida is a rare condition, about one child in fifteen hundred (some authorities put the figure as high as three thousand) being born with this defect.

The committee state that in the ordinary form of spina bifida (meningo-myelocele) the spinal cord traverses the wall of the sac unchanged, giving off its nerves regularly as it lies in the sac wall.

They conclude that there is an absence in the walls of the tumor of the mesoblastic tissues, and accept Morgagni's theory that the deformity is due to lack of development of this embryonic tissue.

What may be the cause of this arrest of development, and what may be the pathological process under the influence of which it is produced, is not known.

In a practice of twenty-five years, I have never seen but three or four cases of this formidable disease. Some years ago I was called to see a case with Dr. J. J. Healy, in which the tumor was in the lower cervical region; it was of large volume,—as nearly as I can remember, about the size of both fists closed,—there was absence of several of the neural arches, and the hernial sac protruded through a cleft in the middle line. This sac was entirely uncovered by skin, and its contents could be diminished by pressure towards the spinal opening, or increased by the position and movements of the child. The unfortunate subject of this malformation lived but a few days.

III.—OPERATIVE INTERFERENCE.

Excision of the Sac.—The older surgeons do not appear to have been so much afraid of a cutting operation as many of their modern successors are. The operative procedure to which we resorted in the case above reported was in principle that adopted and practised successfully by Dubourg more than fifty years ago, though not with catgut and antisepsis. The swelling was cut through with a straight knife, the sac was dissected out and tied at the neck, then cut off, and the cutaneous flaps, after much redundancy of skin was removed, were brought together in the middle line and united by three or four hare-lip pins and the twisted suture.* This operation, says Chelius, is required when the swelling and opening are of small size and the child's health otherwise good.

Gross† unqualifiedly condemns all cutting operations. "Hydrorachitis," he affirms, "is one of the most fatal of diseases. Few children survive their birth longer than five or six months, . . . death being caused, either by convulsions or by ulceration of the sac and the sudden escape of its contents. . . . If the tumor be opened after birth, either accidentally or designedly, death usually follows in a few hours, the immediate cause of dissolution being convulsions from the pressure being taken off the brain in consequence of the loss of the cephalo-spinal fluid. . . . It may be regarded as of a more hopeless character when it affects the cervical region than when it is seated in the dorsal, lumbar, or sacral."

As for treatment, he favors "constant pressure with collodion" and a "common roller with a cup-shaped truss lined with a thin air-cushion, so as to diffuse the pressure equally over the entire swelling." He advises that the compression should be aided by the occasional evacuation of the contents of the sac by subcutaneous puncture with a fine trocar or bistoury. "Only a portion of the fluid should be drawn off at a time; if the whole

* *Journal de Médecine et Chirurgie de Toulouse*, September, 1839. "Chelius's Surgery," vol. iii. (1847) p. 189. Still older authorities condemn all operative interference. See Cooper's "Dictionary of Surgery," 1820, article "Spina Bifida."

† "System of Surgery," vol. iii. (1862) p. 266.

be removed at once convulsions will be inevitable, and the child will perish in a few hours." He remarks that "Benjamin Bell and other surgeons have suggested tying the base of the sac with a ligature, with a view of removing the tumor, and preventing further propulsion of the spinal membranes; but the results which have been published in favor of the operation are not such as to warrant a repetition of it." He adds that, in all the cases of which he has had knowledge, the effects have been most lamentable, the patient dying either immediately after the operation from convulsions, or a short time afterwards from an extension of the inflammation to the spinal cord and its envelopes. "The same may be said of the operation of excision after ligation of the pedicle [neck of sac], and the application of the actual or potential cautery for the purpose of exciting adhesion between the opposing surfaces of the sac. All such procedures cannot be too pointedly condemned, as being both unscientific and certain to prove fatal."

He adds that "the only case in which ligation can ever be proper is where the sac has an uncommonly narrow pedicle, with an exceedingly small aperture of communication, but even under such circumstances, which are extremely infrequent, the safer practice unquestionably would be systematic compression in union with occasional puncture."

With this judgment I understand Wyeth* substantially to agree. He favors "the palliative treatment of spina bifida," which consists in moderate compression over the tumor, to be followed out for one or two years, *unless more radical measures* are indicated by the failure of this method to arrest or greatly retard the growth of the swelling. The only "radical measures," however, which he suggests are drawing off a small quantity of fluid (℥i to ℥i) by the aspirator, the smallest needle being used, and the contents slowly evacuated. He favors Morton's method of iodo-glycerin injection when the tumor is well pedunculated, and the communication between the sac and membranes of the cord is not large. When the communication between the sac and spinal cord is wide, and the tumor is sessile, he believes all operative interference to be contraindicated.

Druitt† takes essentially the same view. "We read," he says, "of cases in which the tumor has been cut off and the edges united by twisted suture, or in which it has been included in a ligature and tightly tied; but these plans will not be readily adopted by any one who would rather not open the spinal membranes or injure the *cauda equina*. The operation of puncture, too, is generally followed by speedily fatal results." He advises "moderate support by means of a hollow truss."

Duplay (*loc. cit.* p. 273) coincides with the above-named authorities,—"Il faut bien se garder d'attaquer la tumeur par les moyens chirurgicaux. Il faut laisser à la nature le soin de la guérison." He suggests compression by collodion (painted over the tumor), and the occasional puncture of the tumor and evacuation of a small amount of liquid, a capillary trocar being employed. This method, he says, is not free from danger; Giralde's statistics show that twelve out of twenty-two children died from puncture; and, moreover, it does not do much good, as the sac rapidly fills up again. He condemns Morton's method, cauterization, excision, the simple ligature, the elastic ligature, yet adds that the ligature may be applicable to cases where the spinal aperture is obliterated or very small.

Finally, Guersant ("Surgical Diseases of Infants and Children:" H. C. Lea & Co., Philadelphia, 1873), after painful experience with the cutting operations, condemns them: "We have had occasion to perform this operation three times in the lumbar region, an elliptical incision being made over the tumor, the finger at once being placed over the opening to prevent the entrance of air, and the wound united by the twisted suture." Guersant's three patients "died of spinal meningitis with pus and flakes in the vertebral canal."

Before closing the argument against surgical interference, this is the proper place to mention the fact that the committee appointed in 1885 by the Clinical Society of London to investigate the treatment of spina bifida, discountenance any radical operation that proposes the removal of the sac or the median vertical portion into which the cord is ordinarily inserted, and are agreed that the treatment by Morton's solution is by all odds the safest.‡ "Ligature of the sac was considered, and here good results seem to have been obtained. Excision likewise had a con-

* "Text-Book on Surgery," New York, 1887.

† "Principles and Practice of Modern Surgery," Lea Brothers & Co., Philadelphia.

‡ *Boston Medical and Surgical Journal*, July 2, 1885, p. 42; *British Medical Journal*, May 30, 1885, p. 1098; *Lancet*, May 30, 1885, p. 989.

siderable proportion of success. The plan of repeated tapping and pressure gave the least successful results of any. The injection of Morton's fluid showed a percentage of success of between fifty and sixty. . . . In spite of the favorable results of ligature and excision of the tumor, as shown in the tables, the committee felt themselves compelled to report against these methods of treatment."

COMMENTS.

1. There is no doubt that cutting operations should be limited to cases where the pedicle (or neck of the hernia) is small, and where the opening into the vertebral canal is small. The opening, in the case above reported, would barely admit the little finger, or, viewed from the interior of the sac, it would only admit a good-sized probe or director. Again, there can but be unanimity in the judgment that hydrorachitis with a large pedicle and a large foramen of exit is not suitable for a radical operation, though even here such operation may exceptionally succeed; nor are those cases suitable that are not completely covered with integument, or are situated in the cervical region.

2. That, however, cases of lumbo-sacral or sacral spina bifida, similar to the one above described, may be with safety treated by a radical operation which shall involve extirpation of the sac and its nerves, if done antiseptically and with care, has been proved again and again.

3. It is admitted that surgical operations with perfect asepsis are much more likely to be a success than operations without antiseptic precautions. It is presumable that the frequent failures of the older surgeons in the operative treatment of spina bifida, as in laparotomy, joint surgery, etc., may have been in part due to the supervention of a complication which the modern surgeon excludes by his rigorous prophylactic means,—viz., septic poisoning. It has been demonstrated that important cavities—the thorax, the abdomen, the large joints, the spinal canal, the encephalon, etc.—may now be opened with impunity, lesions treated, morbid growths removed, and the wound duly closed, and no suppuration or other untoward symptom shall follow. Herniotomy, and operations for the radical cure of hernia, have now become almost absolutely safe, thanks to iodoform, phenic acid, and corrosive sublimate. It will be observed that Guersant's three patients (*vide supra*) "died from spinal meningitis, with pus and flakes in the vertebral canal." Would this result have followed if Guersant had done his operations aseptically? When Gross tells us that cases which had come within his knowledge died shortly after the operation "from extension of the inflammation to the cord and its envelopes," we can but ask, Was this extension a reverberation of the traumatic inflammation, or was it a septic inflammation, due to the introduction of morbid germs by the wound?

Is it not probable that with cleanliness, asepsis, and perfect closure of the wound, the apprehended danger of extension of an inflammation from traumatism is a figment and a bugaboo?

It must be borne in mind, moreover, that there is a wide difference, as far as the danger of septic accidents is concerned, between wounds closed according to the old methods, and wounds closed by antiseptic catgut. Even the ligature of the sac is a far simpler and safer thing when done with chromicized catgut than when done with a material that has not been sterilized. I can well conceive that the success of an operation might be compromised by using a ligature that was not thoroughly aseptic.

4. "If," says Gross, "the tumor (spina bifida) be opened, death usually follows . . . in consequence of the loss of cerebro-spinal fluid."

If death *did* usually follow a simple incision, of course no cutting operation for this disease would ever be thought of. It would appear that Gross, Duplay, and other surgeons who have given expression to the same opinion have generalized from too limited a number of really typical cases. That some rhachidian hernias are attended with this result is undoubtedly true. This is especially likely to be the case where the foramen of communication is large, and where by pressure most of the fluid can be forced into the spinal canal. But in the typical lumbo-sacral tumor (like that which I have described), once or twice drawing off all the sac contents may not be attended with any serious harm.

In fact, it is doubtful whether in the typical hydrorachitis the liquid contained in the sac be the cerebro-spinal fluid. It is worthy of note that in Professor Humphrey's able lecture "On the Anatomy of Spina Bifida," the view which he entertains is that the sac is most frequently formed from the subarachnoid space, thus being shut off from the dangerous arachnoid cavity:* "The sac of the spina bifida appears

* *Lancet*, March 28, 1885, p. 557.

to be formed in the subarachnoid space, and the lining of the sac, as well as the coverings of the cord and of the nerves, . . . must in that case be formed by the subarachnoid or pia mater tissue. It is not always easy to determine, even on dissection, whether the sac of the spina bifida is thus separate from the arachnoid cavity; but, when it is so, the fluid in the sac, and, in like manner, any fluid injected into the sac, will not readily pass into and along the arachnoid cavity and the skull."

In my own patient it seemed to me more probable that the sac secreted (in large part or wholly) its own fluid than that this came from the great arachnoid cavity or the spinal canal. I am perfectly certain that the sudden withdrawal, in one instance of nearly a quart, in another of fully a pint, of cerebro-spinal fluid, would have been followed by a speedily fatal result.*

5. It is probable that Druitt, Duplay, and other surgeons have attributed too much importance to the nerves that in typical spina bifida are spread out over the inside of the sac. Certain it is that cases are now sufficiently numerous where the nerves constituting the cauda equina have been removed with the sac in spinal hernia, with no untoward results following.

6. Clinical experience is proving that the fears expressed by the older surgeons, and by many modern surgeons, respecting operative interference of the more radical sort, such as is implied in the exsection of the sac, or the obliteration of its aperture of communication with the cord, are, if not altogether unfounded, at least exaggerated. At a meeting of the Clinical Society of London, March 27, 1885,† Mayo Robson, of Leeds, read a paper "On a Series of Cases of Spina Bifida treated by Plastic Operation." One of Robson's cases was a female child, 8 days old, puny, ill-developed, with a large spina bifida in the lumbar region. The sac was all excised, "except two narrow portions, which were sufficient to form meningeal flaps, these being covered in by skin flaps obtained by separation and sliding from the lumbar region." The wound healed by first intention. The child afterwards died from marasmus. At the autopsy "the whole lumbar spine and part of the sacrum were bifid."

In another case (an adult) the sac was inflamed and suppurating. Robson excised it by a crucial incision through the skin; the cavity was drained for a few days: recovery.

Another case (patient aged 7 years) was a large spina bifida of the lumbar region. Skin was dissected from sac, and redundant sac and integument removed; suture of meninges by catgut and of skin by wire. Union took place by first intention. "All the operations were done antiseptically, eucalyptus atmosphere being used instead of the spray."

By several successes Robson has demonstrated,—1, the possibility of transplanting periosteum and its capability of surviving; 2, the possibility of attaining a cure by a plastic operation in cases not amenable to any other treatment,—*e.g.*, where the coverings are thin, or the opening into the spinal canal large; 3, the possibility of performing the operation successfully, without immediate closure of the wound,—*i.e.*, where drainage is for several days maintained.

Edward Atkinson, one of Mayo Robson's colleagues at the Leeds Infirmary, has performed an operation very similar to the one which I have reported. In this case the sac communicated with the spinal canal by means of a small opening. Atkinson dissected off the skin, exposed the neck of the sac, ligatured it by means of one circular ligature, cut off the redundant meninges, and brought the skin over so as to have the line of skin sutures quite at the side, away from the pedicle.

Mr. Robson thinks that when the spinal cord or the nerves are blended with the sac, it is better to excise portions of the redundant meninges at one or more places between the nerves, to replace the nervous structures in the spinal canal, and bring over the skin-cover; free drainage should be kept up between the membranes and integuments, and a silver or leather shield worn over the site of the operation in order to protect the parts from injury, and to prevent the cicatrix from stretching or giving way.

In the *Lancet* for July 26, 1884, Dr. Robt. Howson reports a case of excision of a lumbar spina bifida in a child 14 days old; he closed the neck of the sac with a clamp; the case ended in recovery.

In the *Giornale di Clinica e Terepia* (*Lancet*, May 17, 1884) Dr. Antonino Turretta reports a case of spina bifida successfully treated by the elastic ligature: "The tumor was as large as an apple, in the middle line, opposite the two last cervical vertebræ." The ligature,

* According to Professor Ranke, of Munich, the arachnoid (from which the sac is originally derived) is a secretory organ of considerable energy.

† *Lancet*, April 4, 1885.

with the tumor, separated on the twelfth day, leaving a granulated surface, which gradually contracted.

At the Royal Medical and Chirurgical Society, January 22, 1884,* Dr. Walter Whitehead, of Manchester, showed a case of spina bifida cured by operation. The patient was a married woman, aged 29. The tumor was first tapped, then treated by the actual cautery, which was freely applied to the entire surface and circumference of the tumor. In four days the contents of the sac were ascertained by aspiration to be puriform; in the fifth, the sac was laid open and the case treated to its termination by ordinary dressing.

In the *Medical Record*, June 16, 1883, Dr. Robt. T. Hayes, of Rochester, N. Y., reports "a successful operation for spina bifida after the method of Mr. Robson, of Leeds, England. A portion only of the fluid in the tumor was removed before the incision "as a guide to the degree of tolerance present for such a procedure." The skin was then incised and dissected back. The sac was freely opened, the superfluous portion of the membranes removed, and union formed by six interrupted catgut sutures. Some twenty periosteal grafts from the fresh periosteum of a rabbit were inserted on the surface of the membranes, and the external flaps hastily trimmed and closed. The grafts took well, and the operation proved a success.

This operation is similar to one performed by Mr. Robson (*British Medical Journal*, December 30, 1882) on a child 6 weeks old. After removal of the redundant parts, and after stitching up the arachnoid over the spinal canal, periosteum from a rabbit was inserted between the meninges and the skin, so as to cover the gap in the bones. The case was successful. Mr. Robson drew attention to the following points (*Report to the Medico-Chirur. Society*): 1, the operation was performed with full antiseptic precautions, eucalyptus air being used instead of carbolic spray; 2, the meninges were closed by uniting the serous surfaces, as in peritoneal surgery; 3, the transplantation of living periosteum and its continued vitality; it had not yet, however, formed new bone, but already the covering of the canal had a greater than mere skin firmness; 4, the entire absence of bad symptoms in the child operated upon at so early an age was noticed.

In the *Glasgow Medical Journal*, November, 1871, appears the report of an interesting case by Dr. John Wilson, where a spina bifida of the upper dorsal region, in a child 2 weeks old, was treated by free incision, the wound being kept open, but dressed antiseptically. By the free incision, instead of small punctures which might soon close, he hoped to prevent the possibility of the cavity being even partially distended in the future, while at the same time by the antiseptic to obviate all danger of inflammatory disturbance of the cord or its membranes; the ultimate object being to secure complete obliteration of the cavity and the formation of a firm pad over the void in the vertebral column. The plan was duly carried out and with gratifying results.†

In the *Medical Record*, August 2, 1879, appears the report of a case of lumbar spina bifida treated successfully by the application of a stout silk ligature around the pedicle; the contents of sac were then evacuated by a free incision. In eight or ten days the dead mass dropped off, and the stump kindly healed without any further trouble.

In the *Lancet*, October 2, 1886, Dr. John Kellock Barton reports a case of spina bifida in the lumbar region successfully treated by excision. From the fact that no paralysis existed either of the sphincters or lower limbs, Dr. Barton believed this to be a meningocele and not a myelocele. In ten days the child was discharged cured; it subsequently died in a fit of convulsions. Dr. Barton thinks that the convulsive attack must be regarded as a sequel of the operation. Dr. R. W. Parker, in commenting on this case in the *Lancet* for November 20, 1886, declares that freedom from paralysis is not a diagnostic point between meningocele and myelocele. Dr. Barton had stated that in the case on which he operated numerous small nerves passed into the portion removed, which were, of course, cut across. Dr. Parker (who, by the way, wrote the article on "Spina Bifida" in "Heath's Dictionary of Surgery") assures Dr. Barton "that the nerves found within the sac do not pass into the sac wall, but that they arise from it; and that the median vertical portion of such a spina bifida as he describes represents the spinal cord, in fact, is the spinal cord modified by the pressure to which it has been subjected. Mr. Barton's operation was, therefore, equivalent to removal of a portion of the spinal cord. Under such circumstances, ultimate success was im-

* *Lancet*, January 26, 1884.

† *Br. Ret.*, Part 65, p. 137.

possible." He, therefore, dissuades all surgeons from following Dr. Barton's example.

It will be seen from the above citations that quite a variety of operations have been performed,—from excision of the sac without ligature to ligature without excision; from operations followed by perfect closure of the wound to operations in which the wound was left open to drain and granulate. In some the sac was removed in its entirety, in some it was cauterized, and in some it was removed only in part; in some the cauda equina was respected, and in some it was excised with the sac. After reviewing all this surgical literature, I am satisfied that for cases like that of my own patient the operation which I performed is the most rational and feasible.

IV. TREATMENT OF SPINA BIFIDA BY INJECTIONS.

The use of injections for the cure of spina bifida was first suggested by Dr. Brainard, of Chicago, in 1848. His formula is:

℞ Iodinii, gr. ¼ to v;
Potas. iodidi, gr. ¾ to xv;
Distilled water, ℥i. M.
Sig.—Use about ʒss for each injection.

The rules for its use are:

1. Make the puncture subcutaneously in the sound skin by the side of the tumor.

2. Draw off no more serum than the quantity to be injected.

3. Apply pressure during the operation so that none of the solution shall enter the spinal canal.

4. If symptoms of irritation appear, draw off all the contents of the sac and replace them with distilled water.

After the operation the patient should lie on his side, and, if there is much heat, evaporating lotions to the part are required. As soon as the tumor becomes flaccid it should be covered with collodion, or supported by pressure. The injection should be repeated as often as necessary, care being taken that previous irritation has completely subsided.*

Professor James Morton's injection-fluid has glycerin for its menstruum:

℞ Iodinii, gr. x;
Potassii iodidi, gr. xxx;
Glycerinæ, f℥i. M.

It was thought that, as this fluid is less diffusible than either a spirituous or watery solution, it will be found less likely to permeate the cerebro-spinal fluid with rapidity, and so cause shock or bring on convulsions.

According to the London committee's tables (*vide supra*), the injection of Morton's fluid showed a percentage of success higher than all other operative measures,—between fifty and sixty per cent.

Of the seven cases treated by Brainard before the publication of his paper† in 1861, in three only was there a permanent and complete recovery. Dr. Morton states, in one of his earlier reports, that of the fifteen cases treated by his method, twelve were successful and three fatal, and that all his own lumbar cases have hitherto been fortunate.

In successful cases treated by Morton's method, the tumor soon shrivels up and becomes flat. In some of his cases only one injection was required.

The rules for the injection of Morton's fluid are similar to those given by Brainard. A small quantity of fluid is withdrawn, and about half a drachm of the iodo-glycerin solution is injected. The puncture is sealed with collodion. Pressure is applied. When the sac refills, the injection is repeated.

Medical literature for the past ten years has abounded in reports of cases where Morton's method has been tried. The London committee seem to have been justified in their favorable recommendation. They advise a careful selection of cases, and urge that it is foolish to practise these injections when, from the presence of grave marasmus, or a marked condition of hydrocephalus, even the cure of the spina bifida would not offer a chance of materially benefiting the patient.

The treatment certainly commends itself for its simplicity and ease of application. As to the mode of action of the iodo-glycerin injection little is definitely known.

Postscript Note (September 26, 1889).—This is the sixteenth day since the operation described under the head "Clinical Report." The child is well—has full use of all her members. There have been no nervous or other untoward symptoms since the memorandum made on the 16th inst. The wound is almost healed; the line of incision, in which remains of the catgut can still be seen, is marked by a firm cicatrix. A rather thin but solid plastic exudation covers in the site of the former sac and the solution of continuity in the vertebral column.

The result of this case has proved two

* Napheys's "Surgical Therapeutics," 1882, p. 235.

† Napheys, *loc. cit.*

things,—(1) the loss of the fluid contents of the sac in a lumbo-sacral spina bifida is not necessarily a serious matter; (2) the cauda equina is of no special consequence in the economy, and may be removed with impunity when part of a spinal hernia.

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*FURTHER OBSERVATIONS UPON BETA-NAPHTHOL.**

By John V. Shoemaker, A.M., M.D.,
Philadelphia, Pa.†

THE chemistry and physiological action of beta-naphthol has been described by me in investigations and published papers since 1883. In October of the latter year I read a paper on beta-naphthol‡ before the Philadelphia County Medical Society, and in a series of experiments upon animals and several students I pointed out that it was a most valuable antiseptic agent. In addition, I also demonstrated that beta-naphthol, given internally, produced great warmth in the epigastric region after each dose, which passed away in a short time, but left my students with slight vertigo, buzzing in the ears, and with all evidences of cerebral hyperæmia. The alvine evacuations were softened and of a mushy consistence, changed to a clay color, and in one of the cases increased to a diarrhœa. The cerebral symptoms just related were not constant, and only followed after the beta-naphthol had been given in very large and increasing doses. At various times during the past six years I repeated the above experiments upon myself and others with similar results.

Beta-naphthol, on which I have made the observations just related, is a derivative of naphthaline or coal tar. In its state of purity it occurs in silver crystalline scales which can be easily powdered. An impure form of beta-naphthol is now offered to the profession which has been erroneously termed hydro-naphthol. From the researches of Merck, Jacobson, Bouchard, Hoffmann, Endemann, Genois, and myself,§ it has been conclusively shown that, barring the impurity of hydro-naphthol, the difference in chemical constitution between it and beta-naphthol is *nil*. Hydro-naphthol exists only as an impure form of beta-naphthol, and it has been so demonstrated by some of the most distinguished chemists of the day. Hydro-naphthol is, therefore, as I have already shown in a previous paper,‖ a quasi-proprietary preparation, Genois stating very clearly that alpha- and beta-naphthols are the only possible naphthols. Pure beta-naphthol is inodorous and pungent to the taste. It possesses stimulating and slight sedative action applied to the integument or to the mucous membrane. It is soluble in alcohol, ether, fixed oils, and but slightly soluble in water. It has been shown to be dissolved in five hundred and twenty parts of water at 60° F., and in seventy five parts of boiling water.

Therapeutics.—Continued observation has convinced the writer that beta-naphthol is one of the best and most valuable non-poisonous antiseptic agents at our disposal. In pharyngitis, chronic nasal catarrh, hay asthma, whooping cough, and chronic bronchitis beta-naphthol inhalations are of much utility. The beta-naphthol doubtlessly through these inhalations destroys minute organisms should any exist. In gastric disorders, especially in nausea and vomiting from an irritable condition of the stomach-nerves, much benefit follows from beta-naphthol. Good results have also been produced by beta-naphthol in intestinal catarrh depending upon septic changes. Dr. Comby at the Paris Clinical Society recently reported the greatest benefit from beta-naphthol in gastric and intestinal disorders. A writer from Paris in the *Journal of the American Medical Association*, May 25th, not only confirms these views, but also adds that, "According to Dr. Comby's experience, naphthol is an inoffensive medicament, and may be employed for some time without any inconvenience, and he can only corroborate the observations of Professor Bouchard,, who stated that intestinal antisepsy in general, and antisepsy by naphthol in particular, should be practised in all these

* Prepared for the meeting of the Medical Society of the State of Pennsylvania, which was to have been held at Pittsburg, Pa., June 6, 1889. The Society adjourned without taking up addresses and papers, on account of the Johnstown flood, until June, 1890.

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‡ See paper by the author, "Naphthol, its Medicinal Uses and Value" (*Journal of the American Medical Association*, October, 1883).

§ See paper by the author, "The Imputations on Beta-Naphthol" (*Journal of the American Medical Association*, July 14, 1888).

‖ See paper by the author, "The Beta-Naphthol *vs.* Hydro-Naphthol Contention" (*Journal of the American Medical Association*, May 11, 1889).

morbid states which, as for instance gastric disorders, appear to depend on abnormal putrefactions which occur in the digestive tube." The *Jour. de Méd. Prat.* likewise states that Professor Dujardin-Beaumetz has used beta-naphthol with much success in treating secondary fermentation in the stomach and intestine in cases of severe flatulent dyspepsia; also in chronic cases of stomach dilatation from analogous causes. The following combination* he is said to employ: Beta-naphthol, salicylate of bismuth, and calcined magnesia, āā 10 gm. (150 grs.); divide in thirty cachets; one before each of the two principal meals.

One year ago I spoke of the advantage of employing beta-naphthol in obstinate constipation. In some cases of constipation depending upon digestive disturbance, it acts well in from ½- to 3-grain doses three to four times a day. The hard, lumpy evacuations often attendant upon such cases become softened, of a mushy consistence, and may change to a clay color.

Beta-naphthol, on account of its antiseptic effect, is of great value, and may be employed in diphtheria, erysipelas, malarial, scarlet, and in typhoid fevers. Since my original observation upon its internal administration Dr. J. Mitchell Bruce reports also its efficiency in enteric fever,† in which he recommends the following formula:

℞ Beta-naphthol, gr. xx;
Tr. aurantii, f℥ii;
Syr. limonis, f℥ss;
Mucil. tragacanth., f℥iii;
Aquam, ad f℥vi. M.
Sig.—Dose, one ounce.

The same writer also deduces these conclusions for the employment of this useful antiseptic:

1. That the production of intestinal antisepsis is a rational mode of treatment of enteric fever, and that beta-naphthol is a safe and tolerably efficient agent for this end.

2. That by its use in the cases referred to the duration of the disease was shortened, and the intensity of the symptoms directly arising from profound disturbance in the alimentary canal was lessened.

3. That the tendency to the occurrence of splenic enlargement, albuminuria, and of secondary complications, such as boils, abscesses, etc., of purulent infective origin, is diminished.

4. That complete convalescence is more speedily and satisfactorily attained, and that there is less risk of propagation of the disease to others.

Delafield also recognizes the utility of beta-naphthol, and advises it in the treatment of diarrhœa in typhoid fever of infants. He adds, in writing‡ of its administration, "If the diarrhœa be somewhat profuse, give ℞ Naphthol, salicylate of bismuth, āā. 40 gr. Divide into ten papers, one of which should be administered about every hour, either in unleavened bread, a little milk, or a spoonful of Todd's potion. Given thus, the medicine is easily borne and taken without repugnance. If the diarrhœa be moderate, use the naphthol alone, in the following manner: ℞ Naphthol, 40 gr. Divide into ten powders, one every hour. Finally, if there be a tendency to constipation, add to the naphthol a little salicylate of magnesium."

Professor M. Bouchard, of Paris, has beyond all question made the most extensive scientific research upon beta naphthol. From his numerous experiments he regards beta-naphthol as being one of the best of all antiseptic agents employed. In the course of a series of experiments recently made by M. Bouchard and reported (*British Medical Journal*), he concludes that, if intestinal putrefaction plays so important a part in pathology, it is necessary to endeavor to diminish its intensity. This is attempted by the administration to patients of insoluble antiseptics. The disinfectants, in this view, need to be insoluble in order that they may make the passage from one end of the intestine to the other. Nor must they be poisonous, since they are to be taken in large doses. Naphthol is pointed out as best fulfilling these indications. M. Bouchard employs it in various diseases, and particularly in typhoid fever. Under the influence of this drug he finds that the stools are completely deodorized, meteorism is lessened, the tongue is moist, delirium rare. He adds to this treatment the administration of baths of progressively low temperature. A special bath service is provided in his division of the Hospital Lariboisière. Under the influence of this treatment he records a notably diminished mortality, not more than 11.7 per cent., while in the other services of the same hospital it oscillates around 20 per cent.

Dr. John Aulde, of Philadelphia, also writes as follows concerning this drug:

* *Jour. de Méd.*, April, 1889.

† *London Practitioner*, December, 1888.

‡ *The Medical Waif*, May, 1889.

"While my experience with the use of the beta-naphthol has not been very extended, clinical observations warrant the statement that it is a superior remedy for the treatment of all bowel affections in which there is reason to believe that the disease may be due to the presence of micro-organisms, or to the ferments which they produce. Being a firm believer in the conservative processes of nature, I cannot overlook the presence of phagocytes and the relations they bear to the bacteria, and in all cases of typhoid, in diarrhœa and dysentery, and other instances in which we desire the aid of a suitable germicide, naphthol will eventually occupy a high place in the estimation of the clinician. My plan of administering it in the cases mentioned will be understood when it is stated that the best results have followed its exhibition in small doses,—not more than ½ grain to 1 grain every hour or two. For children, ½ grain every two hours is quite sufficient to produce all that can be expected from the use of naphthol, but it must be continued faithfully during a sufficient length of time to effect some change in the condition of the patient, and especially is this true in the treatment of typhoid fever.

"One of the greatest difficulties in using this drug, as well as in the use of many others which are disagreeable to the taste and require to be administered in pill form, is that we are not always certain of the solubility of the preparation. This remark is prompted from the fact that quite recently, in the case of a child with dysentery, the mother told me the second day after the naphthol was ordered that the pills were passed as they had been taken, and nearly all of them were recovered from the stools. This accident can be avoided, I think, by preparing in the form of tablet triturates without compression, and, as a precaution, I would suggest that they be tested for solubility from time to time. In no other way can we be certain that the medicament is in a condition to benefit the affected tissues.

"The favorable action of the drug in the treatment of typhoid is entitled to more than a passing observation. Although it does not seem to have any appreciable effect in reducing temperature, yet the favorable progress of the disease and the slight tendency towards the development of complications, together with the marked improvement in the general condition of the entire alimentary tract, are sufficient to stamp naphthol as an important factor in producing this condition. Under the influence of naphthol the dry, parched tongue becomes gradually moist, and the coating disappears; the disgust for food ceases, and the patient seems to eat with a relish the food that is brought him, and would like to have more; and although the fever remains high, sleep appears to be more normal in its character than when our dependence is placed in other drugs which have been recommended."

In addition to its antiseptic action, beta-naphthol is no doubt also a very useful antipyretic. It certainly possesses the power of reducing fever-heat, as has been illustrated in typhoid fever. In chronic catarrh of the bladder beta-naphthol often acts most serviceably. It is eliminated to a slight extent by the urine, which it affects most beneficially, and has in addition an antiseptic action upon the organ itself. The dose of beta-naphthol for internal use varies from ½ grain to 5 grains every three or four hours. Given in too large doses more or less gastric disturbance may follow; it should, therefore, be administered in repeated small quantities, which appear to act more favorably and be better borne by the stomach. On account of its pungent taste and being only slightly soluble in water, it can be more pleasantly and conveniently administered in tablet triturates. Milk, glycerin, and mucilage are also excellent vehicles in which to administer the drug.

The Local Application of Beta-Naphthol.—Beta-naphthol, as has already been shown, is one of the best antiseptic* agents, possessing most powerful action in destroying organisms. It should therefore be preferable for all topical applications when we wish to accomplish the latter purpose. Being non-poisonous and without odor, it can be freely employed. It can be used either in the form of a powder, solution, or ointment. It possesses a stimulating and sedative action when used upon the skin or mucous membrane. The stimulating properties just alluded to will become most marked, especially if the salt is used in a large quantity upon the integument. It should therefore always be employed with caution, particularly upon a sensitive or an inflamed surface. It may thus, by its stimulating action on the skin, have the opposite effect from that intended, and give rise to a more active inflammation. Beta-naphthol is not, therefore, as a rule, applicable in active

* Dr. Eloy "On Naphthol as a Local Antiseptic," *Gazette Hebdomadaire*, April 19, 1889.

integumentary inflammation unless largely diluted and employed only for its antiseptic action. It acts better and more promptly in subacute and chronic inflammations of the skin.

Beta-naphthol soap, five per cent., or eighty-four grains being incorporated in three and one-half ounces of soap, as I have already pointed out, is valuable for toilet purposes, fetid and excessive perspiration, the bites and stings of animals and insects. The beta-naphthol soap, on account of its antiseptic action, is also of service in very many cutaneous diseases and in offensive discharges of the skin. In wounds and injuries beta-naphthol is one of the most important therapeutic remedies that can be resorted to, on account of its antiseptic properties.

Operations performed under beta-naphthol sprays, with instruments, sponges, and dressings containing the same antiseptic, and the wound irrigated with beta-naphthol, will most certainly prevent the ingress of atmospheric germs. It may be used alone, or combined with some other powder and simply dusted over the surface, in order to protect wounds, to remove fetor, and to bring about a change in the character of the discharge from foul ulcers. The combination of beta-naphthol with a mild and soothing powder, as thus advised, is often of much advantage on account of the stimulating effect of the drug when used alone upon a sensitive or irritable surface. Bandages impregnated with beta-naphthol have been tried, with much good result, by Professor J. L. Reverdin. The *Wiener Med. Presse* (November 4, 1888) reports that Reverdin employed the naphthol as a powder, which he dusted upon wounds, and as a ten to fifteen per cent. gauze. The latter was first sterilized at a temperature of 130° C. (266° F.) and then impregnated with an ethereal solution of naphthol. He has employed the naphthol bandages in thirty-eight operations, of which eighteen were cases of tumor-extirpation, four were amputations, one was a laparotomy, three were radical operations for hydrocele, etc. In twenty-three cases primary union was obtained without a trace of suppuration, even at the opening for drainage; in twelve cases there was delayed primary union; and in three cases suppuration occurred as the result of some mistake in the technique of the operation.

Seborrhœa and furuncles are much benefited by the application of a beta-naphthol solution, ointment, or powder. Beta-naphthol has long been known for its destructive action upon all animal parasites of the skin.

It is especially valuable for its power to kill the itch-mite in scabies, lessening at the same time all inflammation superinduced by the parasite and relieving simultaneously by its sedative effect the irritation of the integument. In truth, beta-naphthol has to a large extent taken the place of sulphur and the mercurial preparations, with their noxious odors and irritable impressions upon the skin. Beta-naphthol is not only valuable in scabies, but also for all animal parasites getting on and in the skin. It destroys pediculi on the skin, and relieves the irritation of the integument from the bites of lice dan fleas, bed-bugs, mosquitoes, and other parasites that get upon the skin. In chronic eczema, in the form of an ointment, ten to thirty grains to the ounce of any fatty substance or incorporated with zinc or lead ointment, it acts most decidedly in lessening the infiltration and itching which may be present. In cases of pustular eczema, three to ten grains of beta-naphthol incorporated in the ointment or solution employed acts as an antiseptic and as a deodorant, and produces at the same time a slightly sedative effect upon the surface. Beta-naphthol employed in the form of an ointment, as well as a plaster (ten to twenty per cent. of the salt being used in the latter), is serviceable in the fissured form of eczema on the palms of the hands and soles of the feet. Psoriasis and acne* are likewise benefited with similar applications. In chronic ulcers, especially when the edges are indurated, either an ointment or a plaster of beta-naphthol often proves most curative from its combined stimulating and antiseptic action upon the parts. Beta-naphthol, either alone or even better with some other astringent powder, is most useful and often most curative dusted over the surface of a chancre or chancroids. The following combination has been employed for both the diseases just named with the most happy result:

> Beta-naphthol, 10 grains;
> Subnitrate of bismuth, 1 ounce.
> Mix. Dust over the surface.

This combination, and many others containing beta-naphthol powdered, has a stimulating, astringent, and antiseptic action upon both chancre and chancroids. It is often of

* "The Treatment of Acne," at Dr. Lassar's Clinic, *Journal of Cutaneous and Genito-Urinary Diseases*, May, 1889.

great advantage in the treatment of the various forms of syphilis of the integument to add to the powder, ointment, or solution used a small per cent. of beta-naphthol, especially for its valuable antiseptic effect upon the diseased surface. The fetor so often present in the various forms of cancer, lupus, vulgaris, and other ulcerating affections may be relieved by the addition of a small quantity of beta-naphthol to the dressing employed. Hyperidrosis and bromidrosis, excessive and odorous secretion, occurring on various parts of the body, particularly in the axilla, the inguinal regions, and the palms of the hands and the soles of the feet are usually benefited or entirely removed by a plaster or ointment of beta-naphthol. The use of a powder containing from twenty-five to fifty per cent. of beta-naphthol is sometimes preferable in these diseases, and appears to act more promptly. Chronic otorrhœa may be successfully treated by an application of beta-naphthol in glycerin or water. Purulent ophthalmia is often controlled or cured by an application of a solution of beta-naphthol. M. Valude,* in the *Transactions of the Ophthalmic Society of Paris*, reports much benefit from the employment of beta-naphthol in purulent ophthalmia, in conjunction with cauterization with the nitrate of silver. He resorts to wet compresses of beta-naphthol, the solution being 1 to 2500. He employs the following formula:

℞ Distilled water, 1000 parts;
Beta-naphthol, .25 part;
Alcohol, 25 parts.

This antiseptic solution, Valude reports, reduces the œdema and swelling of the palpebral folds and integument. In purulent ophthalmia MM. Budin and Vignal, of Paris (*British Medical Journal*), have likewise tested beta-naphthol, and have recommended it as being especially efficacious in this affection, the solution used by them being as follows: Distilled water, 1000 grammes; alcohol, 1 gramme; beta-naphthol, .4 gramme. The ophthalmic editor of the *St. Louis Weekly Medical Review*, August, 1888, commenting on the above report, adds, "Eight cases were reported by MM. Budin and Vignal, the first being that of a woman attacked by gonorrhœal ophthalmia with chemosis. The other seven were new-born babes. A slight epidemic of ophthalmia was observed at the Obstetrical Clinic at the beginning of the month of May; it was due to the fact that the precaution of putting a drop of nitrate of silver collyrium in the eyes of new-born babes had been omitted. The most striking feature in the action of beta-naphthol is its rapidity. The children thus treated did not present any swelling of the eyelids, and the purulent secretion was arrested. In the case of the woman above mentioned, there was neither chemosis nor swelling of the eyelids after two days' treatment."

Beta-naphthol, Paul Delagemere† claims, is one of the most valuable remedies in the treatment of granular conjunctivitis. The same author also reports most remarkable results from beta-naphthol in simple conjunctivitis, often succeeding likewise by its application in cases of trachoma. He recommends, however, caution in the employment of beta-naphthol in corneal ulcerations. Beta-naphthol is likewise one of the most suitable and advantageous remedies to use as a dentifrice either alone or in conjunction with bismuth, chalk, or soap. Beta-naphthol solution, especially in glycerin, is of much service as an application to diseases of the mouth and throat In mercurial salivation it forms a most beneficial application, used as follows:

Beta-naphthol, ½ drachm;
Glycerin, 4 ounces;
Distilled witch-hazel, 2 ounces.
Mix. Use as a gargle.

This same prescription is also valuable for many other throat affections, especially those of a chronic nature. Follicular pharyngitis, elongated uvula, relaxed palate, and chronic catarrh of the fauces may be much benefited by inhalations or the employment of gargles containing beta-naphthol. Beta-naphthol used in the form of a solution is of much value in abscesses and in vulvitis in children. Indurated glands‡ are much benefited and often removed by injections into them of a beta-naphthol solution. Vaginitis, and purulent and offensive discharges from the vagina may be controlled or completely removed by the employment of injections containing beta-naphthol. The same remedy is most useful in gonorrhœa and in gleet owing to its antiseptic action. The following combination is a serviceable injection in the latter diseases:

Beta-naphthol, 2 to 10 grains;
Glycerin, 1 ounce;
Water, 1 to 3 ounces. Mix.

* *Indiana Medical Journal*, February, 1889.

† *Medical Standard*, Chicago.

‡ *Le Praticien*, April 8, 1889.

Among the numerous remedies with which beta-naphthol has been efficaciously combined by me for some years may be mentioned camphor. M. Desesquelle (*Archives de Pharm.*, September, 1888) has also offered the same suggestion. The beta-naphthol-camphor or camphorated naphthol is formed of a mixture of one part of naphthol with two parts of camphor, developing a colorless syrupy liquid, which possesses both local stimulating and somewhat sedative action upon the integument to which it is applied. This mixture is recommended * as less poisonous than carbolic acid. Incorporated with either lard, simple or zinc ointment, in the proportion of five to twenty grains of the beta-naphthol-camphor to an ounce of the fatty vehicle, forms a most valuable antiseptic and combination for very many cutaneous diseases. Desesquelle † recommends beta-naphthol-camphor as a topical antiseptic in excoriations, wounds, and ulcerations, as well as an application to the throat in diphtheria. Dr. Perier ‡ has also used beta-naphthol-camphor with success in ulcers, tubercular laryngitis, and upon the membrane of diphtheria. He reports prompt healing of ulcers upon its application. Beta-naphthol-camphor has proved of great service to Dr. Fernet, § who reported excellent results from its employment in tubercular ulcerations at the Société de Thérapeutique, February 27, 1889.

Buccal tuberculosis, he stated, although not cured, was greatly ameliorated by beta-naphthol-camphor. Fernet also recommended beta-naphthol-camphor in the treatment of boils, ulcerations of the skin of the mouth, and diphtheria.

1519 WALNUT ST., PHILADELPHIA.

ON THE ALLEGED TOLERANCE OF THE IODIDES IN LATE SYPHILIS. ‖

BY HENRY W. STELWAGON, M.D.

THE statement made by Dr. H. C. Wood that a tolerance to full doses of the iodides in central nervous disease is indicative of a syphilitic origin has naturally provoked a warm discussion, in which this distinguished writer stands practically isolated. It has, indeed, been a current saying for years that syphilitic patients failed to show symptoms of iodism, and yet it is difficult to find authoritative statements that could have led to so common a belief. Even at the present day, as all medical teachers, and especially those engaged in dermatological and syphilological practice, must know, the question of this tolerance is often raised by students and practitioners. In the face of my experience with this drug in syphilitic eruptions, both early and late, I can scarcely comprehend on what ground such a belief had been based. For, so far as my dermatological experience goes, which necessarily includes numerous cases of syphilis in all stages, I must say, without the slightest hesitation or equivocation, that there is absolutely no foundation for a belief in this tolerance in syphilitic patients. To give any importance, in such cases, in a diagnostic sense, to the patient's ability to take full doses without the usual physiological or toxic effect, would, therefore, from a dermatological stand-point, be not only without value, but injudicious and unfair to the patient. In this respect my experience is the same as that of those who, with Dr. White, made response to Dr. Wood's paper. The following several cases, briefly noted, are so many reasons for the opinion herein expressed:

CASE I.—J. H., aged 30, came under treatment in February, 1888, suffering with an ulcerating tubercular syphilide, involving the end of the nose and the upper lip immediately underlying. It had made its appearance nine months previously; syphilis was contracted six years before. The mixed treatment was prescribed, but it was soon found that not more than two or three grains of potassium iodide or sodium iodide t. d. could be taken without distressing symptoms of iodism. The symptoms referred to were a marked coryza, with frontal pain, gastric disturbances, and iodide acne.

CASE II.—In the nature, character, and locality of the eruption this case was strikingly similar to Case I. The patient, a female, aged 43, was first seen in March, 1887. The present eruption had lasted seven months. Date of contraction of syphilis unknown, but the history indicated some years previously. In this patient the iodide, even in small doses, was not well borne, and seemed also to be

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* *London Pharmaceutical Journal and Transactions*, September 20, 1888.

† *Journal de Médecine de Paris*, No. 7, 1889.

‡ *Semaine Médicale.*

§ *Le Progrès Médicale*, March 9, 1889.

‖ Read at the Thirteenth Annual Meeting of the American Dermatological Association, September 18, 1889.

without influence on the eruption. Acne, coryza, and cephalalgia soon followed its administration, and it was necessary to discontinue. Under mercury the patient made a rapid recovery.

CASE III.—This case, a male, aged about 25, came under my notice in the winter of 1888, in the Skin Ward of the Philadelphia Hospital. He was suffering with a traumatic ulcer of the leg, for which, under the impression that it was of a syphilitic origin, the resident physician prescribed 10-grain doses of potassium iodide t. d. The history of the case disclosed the contraction of syphilis six or seven years previously. No improvement taking place in the ulcer, the dose was increased to 20 grains. A few days later a pustulo-bullous eruption developed on the face and hands. The lesions apparently involved the deeper skin tissue, and were elevated from an eighth to half an inch above the surface. Some were the size of a bean, others almost the size of a hen's egg. It was at this time that the patient came under my care, having been transferred from the Surgical to the Skin Ward. The eruption was recognized as probably due to the iodide, and its further administration was discontinued. In the course of a week the lesions had almost disappeared. He was again given the iodide to determine beyond doubt its causative relationship to the pustulo-bullous eruption. As soon as 20-grain doses were reached the lesions rapidly made their appearance. On discontinuance of the drug the eruption as rapidly retrogressed.

These several cases are here presented as striking examples of late syphilis, in which the intolerance to the iodides was unmistakable. Nor are they exceptional cases, as the notes of many more such examples could be given if the subject demanded it. These, however, are sufficient to indicate the basis upon which my opinion on the question of the tolerance of iodides in syphilis rests. Exceptional instances also occur in which the disease, although undoubted syphilis, fails to respond to extreme doses of the potassium or sodium iodide. Take, for example, the following case, and if the tolerance of full doses was to be looked upon as diagnostic, the result upon pushing the drug should have been confirmatory. On the contrary, although it was a clear case of syphilis, the drug was absolutely powerless.

CASE IV.—The patient, a well-built, robust man of 36 years, came under treatment in 1886. He had contracted syphilis several years previously, and had made an apparent recovery. Some months ago, however, a tubercular and gummatous syphilide appeared on the scalp and one hand, and was rapidly progressive and destructive. The ordinary plan of treatment was adopted, but with no result. Finally, the iodide of potassium was prescribed, without the mercury, as in the preceding treatment, and the dose rapidly increased. Beginning with 20-grain doses t. d., the quantity was increased daily until the patient was taking six drachms a day, without a symptom of iodism, and although this dosage was continued for one or two weeks, there was not the slightest influence upon the course of the syphilide. This patient was finally cured by mercurial remedies alone.

Another case, presenting a slightly different phase, may be added.

CASE V.—This patient, a male, of about 40 years, presented himself several years ago at the Skin Service of the Northern Dispensary. He sought treatment regarding an acne-like eruption on the nose and on the parts immediately about the alæ.* In this patient, 30-, and even 40-grain doses t. d. were without effect, and a possibility of an error in diagnosis was considered, and the case then tentatively treated as simple acne. No benefit resulting, and the diagnosis of syphilis having been previously made after the eruption had been carefully studied, the iodide was again administered, and the dose increased to 60 grains t. d. This amount of the drug brought about rapid improvement, and in a short time a complete cure. There were, however, during the administration of the drug, evidences of mild iodism.

It cannot, of course, be denied that some patients with syphilis bear the drug well, but this holds equally true with non-syphilitic patients. This latter is shown in the report made by Haslund† on the treatment of psoriasis with large doses of iodide of potassium, and it will be found that in these cases, presumably free from syphilis, that iodism was no more common than it is observed to be in syphilitic patients. In this report brief tabulated notes of fifty cases are given. The dose per day varied in the different patients from one hundred and fifty to seven hundred

* "A Case of Late Cutaneous Syphilis (Acne-like Syphiloderm of the Nose), illustrating the Occasional Necessity of Large Doses of Potassium Iodide" (*Philadelphia Medical News*, June 27, 1885).

† *Vierteljahreschrift für Dermatologie und Syphilis*, 1887, H. 3.

and fifty grains, and yet with these enormous doses it was recorded that in a fair proportion iodism was not observed. My own observations in regard to iodism in late cutaneous syphilis would show its occurrence in about the same proportion as in these cases of psoriasis tabulated by Haslund. In experiments lately made by Dr. Hartzell and myself in the Skin Dispensary of the University Hospital, and also in the Skin Ward of Blockley Hospital, as to the curative effect of full doses of iodide in psoriasis, suggested by this paper by Haslund, symptoms of iodism were not observed to occur with any greater frequency than would probably have been noted had the cases been syphilitic. The fact also cannot be forgotten that in many of the cases of serious cutaneous disturbance from the ingestion of potassium iodide, which have been reported in the journals the past several years, the drug had been administered for late syphilitic manifestations.

Indeed, with the light that has been thrown upon this subject the past year, it can no longer be doubted that as regards cutaneous syphilis, early or late, there is just as much probability of iodic symptoms from the administration of the iodides as were the patients non-syphilitic. As to the contention that in central nervous syphilis iodism is an extremely rare occurrence, Dr. Wood, it must be confessed, has those who hold opposite views at great disadvantage, for, with possibly one exception, those replying to his paper are dermatologists and syphilographers, and not neurologists. But it is irrational to suppose that if patients with other manifestations of syphilis show no freedom from iodic symptoms, those with nervous syphilis should prove an exception. It could be readily admitted, I think, if we are to accept the latest view as to the production of symptoms of iodism through the agency of the central nervous system, that in serious disease of these parts the appearance of such symptoms might be hindered or modified. But an explanation of this kind would hold equally true in regard to non-syphilitic nervous disease; whereas Dr. Wood contends, it will be remembered, that the absence of iodism where full doses are given to cases of grave nervous disease is reason for believing that the disease is in all probability of syphilitic origin or nature.

In conclusion, it may be said, however, that at present the general evidence is overwhelmingly against the correctness of such statement.

CLINICAL OBSERVATIONS ON RHUS TOXICODENDRON.

By John Aulde, M.D.*

SOME years ago, while looking up a desirable remedy for the relief of an obstinate case of sciatic rheumatism, my attention was attracted by some remarks dropped by one of my patients, who claimed that he had long suffered from what is termed varicose veins and from chronic rheumatism, which the doctors had pronounced incurable. He was advised to obtain a preparation made from the poison sumach, which is referred to generally as rhus toxicodendron. He told me that the parties giving him the remedy advised him to take only so many drops,—5 drops, I think; but he said he took as high as 9, and felt no bad effects from it. He said he believed it would be safe to take as many as 15 drops. I thereupon began an investigation as regards the history of this drug, and found that it had been used only to a limited extent, and was not generally believed to possess any value, although it was regarded as an acrid and dangerous poison. With a view to obviate any dangerous symptoms which might arise from its use I began with very small doses, and was agreeably surprised at the result which followed its exhibition in suitable cases.

In the latter part of April I published a short communication in one of the medical journals,† which attracted wide attention on account of the character of cases related, most of them being of a character which indicated that the trouble was rheumatic, and it included sciatic rheumatism, muscular rheumatism so called, and varicose veins; but, in giving an account of these cases, I inadvertently omitted giving full particulars in regard to the dose of the drug. The result was that I received a considerable number of communications from members of the medical profession throughout the country in regard to the dose, asking me for more information, and for instructions in regard to the preparation which I had used, and the effect which might be expected from the ingestion of large doses. In order to comply with these requests, and to further the interests of the profession, I made arrangements for procuring a supply of the drug, and to each applicant I forwarded

* Demonstrator of Clinical Medicine and of Physical Diagnosis in the Medico-Chirurgical College of Philadelphia.

† *Medical News*, Philadelphia, April 20, 1889.

a sample, with instructions for use, and at the same time requested that within a reasonable period they should advise me of the result of treatment which might come under their observation. I have now received quite a number of reports from physicians in different sections, although there are others who have not yet reported the results of treatment; some have not had an opportunity of using the drug, while others have not had sufficient experience to warrant them in making a statement. There seems to be considerable diffidence in giving an opinion concerning a remedy which is altogether new and is given in such small doses as rhus toxicodendron. The object of the present paper is to give a summary of the experience of those gentlemen who have been kind enough to send me their reports, and at the same time I wish also to give full instructions in regard to the preparation and the dosage and other matters, which will enable those who use the drug to determine the indications for its use.

The preparation which I have used is the tincture, prepared according to the directions of the Pharmacopœia for the making of tinctures from fresh herbs,—50 parts of the fresh leaves to 100 parts of alcohol. This makes the strength of the tincture 1 to 6, although certain manufacturers claim to be warranted in estimating the strength at a lower proportion,—namely, 1 to 8. The dose of this tincture, in my experience, does not exceed ½ drop. It should be prepared with diluted alcohol, and used in the strength of 1 part to 10,—that is, 1 part of the tincture to 9 parts of diluted alcohol. The dose of the solution will, therefore, be 5 drops, each dose containing one-half drop of the ordinary tincture of the Pharmacopœia.

It will be convenient here to refer to other preparations of this drug, but more especially to preparations of the fluid extract. Some of my correspondents, after reading my article, procured some samples of the drug, but were unfortunate in not obtaining the expected results from its use, and accordingly they wrote to me. One complained that the dose of the preparation was too small, while another said the dose of the fluid extract, as given upon the labels of the bottles containing it, was too large, and, further, that the fluid extract did not correspond with the tincture which I had sent them in color and in the odor, as learned from applying the bottle to the nostril. My own investigations with the fluid extract on the market have not been completed, but at this time I am not disposed to take kindly to its use, for the reason that it is lacking in some of the more important properties which may be noticed in connection with the tincture; and I am inclined to believe that whatever virtue lies in the toxicodendric acid contained in the plant may be lost in the process of drying. When we bear in mind the active poisonous properties of this plant, and remember that during the early spring many persons cannot safely expose themselves to the most gentle zephyr which comes from the direction of the poison sumach, this assumption does not seem unwarranted. In preparing the solutions for use in the office, I have often felt an unusual and not a very comfortable sensation in the pharynx, although I do not think I am especially susceptible to the action of the poison, never having had any symptoms after exposure. Again, my suspicions were aroused owing to the maximum dose of the fluid extract which was permitted. According to my calculation, it is at least six hundred times the maximum dose that I have been in the habit of using; and, I may add, that frequently I have met with most happy effect from the administration of doses the size of which, as compared with that now recommended, would make the latter appear immense. Some of these results have been observed in the most stubborn cases which have come under observation, when other drugs and methods of treatment had utterly failed, and I am, therefore, disposed to conclude that the active principle lies in the toxicodendron acid, and that this active principle is lost in part, or wholly destroyed in drying. The foregoing statement seems to be demanded for the reason that many physicians reading this article will conclude that any preparation will answer, and when they fail to observe the effects claimed for it, the drug will be roundly condemned.

As an offset, however, to any *dénouement* of this character, I have been so fortunate as to get very flattering reports from various sources, in which competent and disinterested observers relate fully the experiences which have followed its administration in different classes of cases, and my thanks, as well as the thanks of the entire medical profession, are due to these gentlemen whose names are mentioned below as having used this new remedy for the relief of diseased conditions.

Since the publication of the paper referred to, my own experience has been substantially the same as it had been previous to that time, but it may be well, however, to caution the

reader that rhus toxicodendron is not an infallible remedy for all rheumatic affections. I do not think it would be of great benefit in acute attacks, and my experience does not justify the statement that it can be depended upon invariably for relief in all chronic cases. I may mention as an illustration of this two cases coming under observation recently, that of a gentleman and his wife, who are now approaching 70 years of age. The husband, forty years ago, suffered from inflammatory rheumatism; it became chronic, and he was long unable to walk without a cane, and in coming down-stairs in the morning he was so stiff that he was compelled to crawl down backward. The wife has lately suffered from rheumatic attacks, stiffness, pains in the knees, fugitive pain in the ankles, in the feet, and in the shoulders. At first the medicine affected her promptly; in less than two days she was able to walk without the least difficulty, and apparently had fully recovered; but, unfortunately, she was suffering from a general debilitated condition of the system, which was further complicated by heart-trouble.

An attempt was made in this case to increase the nutrition by tonic treatment, by advising rest and nutritious diet; but, unfortunately, the advice was not taken, and the patient insisted upon being around and at work, and, I believe, was unwilling to take the necessary rest which nature demanded. The result was that she became worse after a time, and, as the pain returned, she requested that something should be furnished which would afford relief, and, fortunately, I found in antipyrin a remedy of sovereign value. The husband, on the other hand, enjoys much better health, and, notwithstanding the rheumatic element, is able to conduct his business, which is that of a florist, evidently much improved. He had not taken the medicine a week until he realized that he had feet, something which he had not felt for the preceding five years.

In reply to my inquiries as to the experience which has been observed after the administration of rhus toxicodendron, the following-named gentlemen have communicated to me the result of treatment. Some of the communications have been abridged, but no matter of material significance has been omitted. Items of a personal character have been eliminated, and some of the details connected with the cases have been left out, simply for the purpose of economizing space.

Dr. B. W. Allen, of Jernigan, Ala., writes as follows: "I have used the rhus in two cases. One was that of a lady, 68 years of age, who had suffered from sciatica in the right leg for some time. When first taken was unable to walk at all for several weeks, but, by the aid of a stick and chair, she was able to walk around the room when I began giving the rhus. I saw her one week after she began taking it, and she was then walking without the assistance of any one, and has since then walked to a neighbor's house and back, which is half a mile. She still complains occasionally of pain in the hip, but by recurring to the rhus is promptly relieved. The second case was that of a lady, 28 years of age, who had been suffering from a chill, with neuralgia in both arms. About six months ago the pain became almost constant, and I exhausted the materia medica in trying to relieve her, but failed until I put her on rhus. She took two drachms of the solution, and I have heard no further complaint from her. Was told a few days ago that she had not suffered any since taking the medicine. Will say in conclusion that I consider rhus toxicodendron a valuable remedy in the treatment of neuralgic affections such as you suggest."

The dose of the solution, prepared according to the formula given by me, was 5 drops in water three times daily.

Dr. T. C. Fenton, of Streator, Ill., makes a report covering the use of the drug in several cases, of which the following is a summary:

"Case I. was that of a widow, æt. 55, who, about ten years ago, had a severe attack of acute rheumatism, and since then has had slight muscular pains. About May 1 the rheumatism affected the left knee, and was very painful, extending upward to the groin; she was able to sleep but little. Took the sulphate of quinine, salicylic acid, and salicylate of sodium, with no effect. On May 10 I gave her some of the rhus tincture diluted, with directions to take 5 drops in water three times daily. After she had taken four doses I saw her again, when the pain had nearly all left, but she complained of a sort of numb feeling. She said when she awoke that morning all rheumatic pains had gone; but, in her words, 'a numb, dead feeling' was present, and she could not bear her weight on that limb. I urged her to try to stand on that foot, but after a prolonged effort, during which time I used massage, all attempts failed. She had taken about sixteen doses,

but the first four doses took all the pain away, which, during the first ten days of May, was very severe. The strength returned to the limb, but the stiffness remained. Now she is stiff in both legs and a little in the arms.

"CASE II.—Rheumatism of the thigh, extending to the knee. Took tincture of rhus diluted, 5 drops for a dose, three times daily, for six days, with no relief.

"CASE III.—F., aged 25; pregnant seven months; neuralgia of face; of a nervous temperament; in great suffering. Gave the same dose of the rhus as in Case II., with no effect.

"CASE IV.—Male, aged 38; was attacked with a severe pain, most certainly in the great sciatic nerve; had pain constantly for four weeks. Was treated by three other physicians in this place. Came to me, and was treated with everything in the way of medicine that I knew of, all to no purpose. Was becoming weak and nervous for want of rest and food. I advised him to go to Chicago. He did so, remaining in one of the hospitals attended by one of Chicago's best physicians for ten days, when he came home about as he went. He intended to return to Chicago in a few days. I saw him, and asked him to try another remedy. Gave the tincture of rhus toxicodendron diluted, with directions to take 5 drops in water three times daily. After taking five doses, he awoke in the morning scarcely able to find his sciatic pain. Felt only a few twitches of it that day, and has never felt it since; feels well and strong."

Dr. Fenton now asks, What was the difficulty with the first case? He thinks probably he may have used too large a dose of the medicine. There is still stiffness and some slight paralysis remaining. In the second case, I should say probably the drug was not adapted to the disease, or was not continued long enough. In the third case, all general practitioners well understand that those peculiar neuralgic and facial troubles are likely to appear in cases of that character, and often fail to yield to any treatment.

Dr. J. B. Laidley, of Carmichaels, Pa., reports the following interesting case:

"The patient, a minister, about 80 years of age, is now subject to, and has for several years suffered from, chronic cystitis. After serving his people as usual on Sunday, the 13th of June, was suddenly taken with severe pain along the course of the sciatic nerve. I saw him on Monday, and, after administering a hypodermic injection of morphine, ¼ grain, placed him upon the tincture of rhus toxicodendron, 4 drops of the tincture, prepared as you directed, every four hours. With the exception of the hypodermic of morphine once each day, I gave him no other medicine. There was no change observed until Saturday, the 22d, when he was decidedly better. On Sunday, the 23d, however, he was worse, partly from an increase of the cystic trouble. The hypodermic injection of morphine was continued until the 26th, on which day it was omitted because of freedom from pain, since which time he has steadily improved, and for two days has had no pain. On Monday, the 24th, I gave him three doses of 4 grains each of the sulphate of quinine; with that exception he has had no other treatment than as above described. He had two previous attacks of sciatica, the first very obstinate, disabling him for about three months, both attacks being finally arrested by the use of the actual cautery, so that I have good reason to believe that the new remedy has had a decided effect in relieving him of this attack. With the exception of two days—the 23d and 24th—he informed me that his cystic trouble has been greatly relieved since his confinement to bed with the other trouble. I will advise you as to whether the relief he now enjoys proves permanent. I continue the remedy."

Dr. H. A. Mobley, of Byromville, Dooly Co., Ga., reports two cases, as follows:

"The first, a case of sciatica of six months' standing, in which rhus was given for about two weeks. Prior to this he had poor results from the use of colchicum and the salicylates, from which but little benefit was derived. After taking the rhus," he says, "the patient has been in better spirits, walks with much more ease, and is in better condition generally. He (the patient) says it has not benefited him at all, though I am inclined to the contrary opinion. However, I do not consider the case a fair one for trial. The other is one of articular rheumatism in a 12-year-old boy, very weak, pale, and anæmic. He came under treatment before I received the sample, though he is now on tonic treatment, with the rhus as a specific. He has gained in weight, looks one hundred per cent. better, and the pains are about gone. He is well pleased with the progress, and thinks he will soon be well. You are aware," he says, "that in the country like this we cannot experiment with the same ease as the city brethren, nor can we keep as perfect a record. I try hereby to show my appreciation of your kindness, and while the above is in no form of a report,

if you can obtain any encouragement from the results of a treatment, which you seem to have originated for this most formidable type of disease, I will feel amply repaid for this note."

Dr. B. Powell, of Houston, Texas, writes as follows:

"*June* 20.—I have suffered for years with rheumatism, and when I saw your article in the *Medical News* had almost despaired of ever obtaining relief, and when the medicine and directions arrived I was so sceptical that for some days I delayed using it. The dose seemed so infinitesimal. I was suffering so much with stiffness and pain around the knee and ankle-joints that I commenced with 5-drop doses, and in three days I began to feel better than I had done for months. I have continued until date, and now scarcely recognize the existence of pain. True, the stiffness has not all disappeared; nevertheless, I feel confident that the continued use of the rhus will entirely restore the suppleness of the articulations. I shall continue the use of the drug, and shall use it in my practice."

On the 28th of the month, Dr. Powell writes me to say that the action of the medicine has been beneficial in another direction. He says,—

"I did not when I wrote you state the effect of the medicine upon hemorrhoids. I have suffered from that intractable trouble for years, but while taking the rhus I was entirely free from all rectal annoyances. Immediately, however, upon stopping the medicine the piles returned. I don't pretend to say that the freedom from piles experienced while taking the medicine was the result of the drug, or simply a coincidence. Still, I am inclined to believe that there was a direct effect produced upon the varicose blood-vessels of the lower rectum. At all events, upon taking the rhus again, the rectal trouble is much less, and, by continuing its use, I hope to finally be rid of both rheumatism and hemorrhoids. If this is a *post hoc* instead of a *propter hoc*, I shall soon discover."

Dr. J. Richard Taylor, recently elected to the Chair of Practice in the Medical College of the State of South Carolina, at Charleston, writes me as follows:

"I have not had many opportunities for testing the rhus. In cases of subacute and chronic rheumatism affecting the muscles I have found it very efficient, though less prompt than sodii salicylas, but with the advantage of being always tolerated by the stomach of delicate patients. In the soreness of muscles so common after hysterical convulsions I have found it *very* prompt, relieving the pain and stiffness within a few hours."

Dr. J. W. Welch, of New Hope, Mo., writes as follows, under date of June 17:

"I have been able to test the rhus in only two cases. My wife had suffered from severe rheumatic pain under the left scapula for several weeks. Before I employed the rhus she had taken the usual remedies, and used counter-irritation without benefit; but just about the time I received your sample of rhus she applied a belladonna plaster over the scapula. The tincture was diluted with alcohol, as directed by you, and given in doses of 3 drops thrice daily. In the course of two weeks she was entirely well. I also gave it to an old lady suffering from sciatica, whose condition had not been benefited by several months of treatment with salicylate of sodium, and many other remedies usually employed in such cases. She is better, and thinks the medicine benefited her. I am unable to express a decided opinion in regard to the merits of rhus in chronic rheumatism from the limited opportunity I have had of observing its effects, and think it might be given safely in larger doses and with better effect."

Dr. J. B. Whitehead, of Lovingston, Va., reports two cases under date of June 15. He says,—

"I have used the rhus in only two cases. One is that of a man, 45 years of age. He had sciatica in both nerves for several weeks before using the rhus. I gave him 1 drop of the solution (made as you directed), which was increased in a day or two to 2 drops three times a day. In about a week he was well. He says that it not only relieved the pain but gave him a good appetite. The other case is that of a woman about 65 years of age. She has had heart-trouble for over twenty years, and suffers almost constantly from rheumatism and neuralgia. She was not improved, but I am inclined to think it may be due to her not giving it a fair trial. The dose being 1 drop, she concluded it was *very* dangerous, and consequently did not take it as she should have done."

Dr. Whitehead says also that he would like to know what would be the effect of too large a dose, and what would be the effect of the drug if too long continued, questions which I shall briefly consider in connection with the comments which seem to be demanded from the history of the foregoing cases.

Remarks.—To say that the foregoing records present a remarkable showing is but to

express the matter in mild form, and had they come from a single observer, these cases would have been regarded suspiciously, if not set down as gross exaggerations. Seven cases were reported in April, representing as many different diseased conditions, but they by no means cover the extended uses to which I have applied rhus toxicodendron, from the fact that it is a drug almost daily in demand, and this has been the case for the past two years, so that the unusually wet season we have experienced in this section does not altogether account for the prevalence of the class of cases in which it may be used with a reasonable hope of success.

The cases reported by Dr. Fenton are somewhat peculiar, but I think these peculiarities can be accounted for without any discredit to the drug. The trouble with the first cases was in all probability due to venous stasis rather than to an overdose of the drug, but it shows the great power of the remedy over that class of affections, and, in reply to his inquiry, I advised him to place the patient under the influence of small doses of strychnine to improve the strength of the limb, and for the stiffness I should recommend antipyrin in doses of not more than 5 grains every two hours, until there was an abatement of the symptoms. Faradism to the muscles would also be valuable, and might be used as an adjuvant to other treatment. In his second case, the drug may not have been long enough continued, or there may have been complications, of which I shall speak later, which should have received attention in connection with the exhibition of the rhus. The third case, that of the pregnant woman, is one of those very intractable cases met with occasionally by the general practitioner during the later months of pregnancy, and is frequently attended with softening and breaking down of the teeth, showing that there is such a demand on the part of the fœtus for bone-making material that the nervous system of the mother becomes exhausted. Such cases should have attention to the functions of the liver first, and the bowels should be kept in a healthy condition by simple measures, when it will be found advisable to take into consideration the value to be gained from the exhibition of the phosphates, and possibly the judicious administration of arsenic in some of its forms.

Dr. Powell speaks very highly of the value of rhus in connection with the pain and annoyance attending the presence of hemorrhoids, all of which I can fully endorse. It is truly wonderful how quickly local irritations of this character and varicose veins are subdued, and my observations incline me to consider favorably the use of some drug in connection with the rhus which will favor a more active discharge of the functions of the lower bowel, from the fact that hemorrhoids and constipation often go together. Few physicians would be willing, however, to say that there was any relation existing between rheumatism and hemorrhoids, or between rheumatism and varicose veins; but it seems to me that a relationship can be inferred, if not demonstrated, from the results which attend the exhibition of certain remedies. Knowing that cascara sagrada has been highly extolled for the relief of rheumatism, and knowing, further, that it acts mildly as a laxative, and is thus calculated to reduce the congestion of the pelvic organs, including the rectum, I have made a combination of the rhus with cascara cordial with the happiest effects.

The *complications* which are to be met in connection with the exhibition of rhus for chronic rheumatic and allied affections may be estimated when we consider that the source and real character of the disease are still shrouded in mystery. The farmer, when about to prepare for sugar-making in the spring, knows very well, from the appearance of the bark of the trees, which are the hard and which are the soft maples, and makes his selection accordingly; but the physician, when he is confronted with a case presenting peculiar symptoms, while he may be satisfied that there is a real cause, he is unable positively to determine the root of the difficulty, and must await developments, just as an inexperienced farmer would have to await the appearance of the foliage on the trees before being able to determine the real character of the tree. It would then be too late to tap, because the sap has gone to the branches. We are frequently at a loss to say positively if a case will ultimately develop into rheumatism, gout, or diabetes, and, when a nondescript affection appears, we endeavor to cover our ignorance by calling it something which shall not decide which it is, as in the case of so-called rheumatic gout.

But this question opens up a field of such vast extent that its consideration will have to be omitted at this time, although it would be interesting to study the influence of this drug upon the poisons found in the system, such as result from decomposition, from the products of microbic and bacterial changes, as well as its influence upon suboxidation. The prompt

results following its use in many cases coming under the observation of the writer, coupled with the confirmatory evidence related above, all combine to lead us to the supposition that the drug accomplishes something more than simply the relief of pain, and indicates that it may even in very small doses have some very decided effect upon metabolism. This, however, is a duty which devolves upon the physiologist rather than upon the clinician, and I trust in the near future that so promising a remedy will not fail to attract their attention.

Dr. Laidley's case of cystitis shows unmistakably that it does modify the urinary secretion, and my own experience proves beyond question that this action in cystitis is curative. After the exhibition of the drug for a few days, the urinary flow is decidedly increased, and the acid character is modified to that extent that no disagreeable symptoms attend upon micturition; the appetite improves, while he who has suffered torments in trying to secure much-needed rest is lulled into a repose which is not unlike that of early childhood.

There are many other things which might be noted in connection with its therapeutical indications, but sufficient has been said to prove conclusively that rhus toxicodendron is a drug which is fully entitled to our consideration and study, and, as has been suggested by Professor Taylor, it may often be used with advantage when patients cannot take other medicine which has a tendency to derange the stomach. I have no doubt but that other indications will be pointed out for its employment by those who become familiar with it from practical experience, after they have become convinced, as others have been convinced, of its efficiency even in small doses.

Replying to Dr. Welch's suggestion that larger doses might be used with better effect, I am unprepared to say, as thus far I have been able to get all the effects from the administration of the doses mentioned that could be expected of the drug under any circumstances, and while the small doses only are used, the dangers from toxic symptoms are not likely to arise. Dr. Whitehead's case, in which 1, then 2 drops of the solution were given with marked benefit, apparently furnishes a complete answer to this question. One drop, it will be remembered, represents but one-tenth of a drop of the tincture, the dose which Dr. Whitehead's patient took at first, although I would suggest that as the drug appears to be promptly eliminated through the kidneys, when smaller doses are taken they could safely be repeated at more frequent intervals, and under such conditions I have no doubt more prompt effects would follow its exhibition.

4719 Frankford Avenue.

A PLAN FOR RELIEF OF WHOOPING-COUGH SPASM.

Dr. Naegeli publishes in the *Correspondenzblätter für Schweizer Aerzte*, a paper on whooping-cough, in which he pays particular attention to the convulsive attack of choking, describing the latter as follows: Spasm of the glottis makes every inspiration impossible, tonic convulsions of all laryngeal muscles follow, all muscles of the throat, and at last those of the face, also share in the attack. Trismus almost always is present during the acme of the convulsion, although the tongue generally protrudes. As soon as it is possible to open the rima glottidis again so far as to admit of sufficient air for respiration, all sensation of choking and congestion of the blood with their sequelæ disappear as by a miracle. Heiberg was the first to observe that the raising of the upper jaw is the best method of making the larynx admit air, and he recommended a plan for that purpose, which Kappeler had mentioned before him, and which Naegeli has modified and described as follows: Standing in front of the child, the nurse lays firm hold with the index and middle finger of the ascending ramus of the lower jaw in front of the ear, places both thumbs against the chin and by strong but gentle traction and pressure moves the lower jaw forward and downward. If the mouth is a little open the jaw may be fixed by placing the thumb or index finger along behind the anterior lower incisors and grasping the chin with the rest of the hand, performing traction as above. In all these cases the left hand rests on the forehead of the patient and performs counter-traction. If the nurse is behind the patient, she may place both thumbs close above the angle of the jaw, the index on the zygomatic arch, and the rest of the fingers on the chin, pushing forward and downward. Immediately the upper jaw is raised the child must be told to draw a deep breath. The plan may be adopted even if the fit comes on during sleep, and Naegeli says that if so the child does not wake.—*Lancet*, August 17, 1889.

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Leading Articles.

THE PHYSIOLOGICAL ACTION OF THE ALKALOIDS OF COLCHICUM.

IN the *University Medical Magazine* for July and August, 1889, Dr. Adolfo Ferrer y Leon publishes a paper with the above title. He finds that under the influence of colchicine there is a progressive failure of reflex activity, which probably depends upon the depressant action of the sensory nerves, while he claims that it produces marked fall of bodily temperature, fall of arterial pressure, and slowing of the pulse.

The author makes the questionable statement that the "slowing of the pulse is not due to stimulation, but to depression of the heart," claiming that the truth of this statement is proved by the fact that section of the pneumogastric produces as rapid a rate after the administration of colchicine as occurs normally when the nerve is cut. Although the author's experiments in this connection are very imperfect, as far as they go they seem to show that the slowing of the pulse, produced by the injection of the colchicine, is due to the stimulation of the cardiac inhibitory centre in the medulla. Of course, to settle the question, the drug should be injected after previous division of the pneumogastrics. This, unfortunately, the author has neglected to do.

On the other hand, the single experiment which is published appears to show that the drug produces considerable increase of blood-pressure, rather than fall of arterial pressure, as claimed in his conclusions, the pressure rising from 117, the mean pressure at the time of injection, to 168, the mean pressure six minutes later, at the time of section of the pneumogastrics. No light is thrown on the causation of the rise, or as to why the author drew a conclusion opposed to the published facts.

As regards colchiceine, which results from the action of dilute mineral acids on aqueous solutions of colchicine, it is claimed by the author that it produces depression in excitability of the motor nerve-trunks without action on the sensory nerves, and that it possesses but little action on bodily heat.

As regards its action on the circulation, the author states that there is produced a slowing of the pulse, which is but slightly altered by section of the vagus nerve.

"That this slowing of the pulse was not due to cardiac depression, as occurs with colchicine, is apparent from the fact that there was no fall of arterial pressure, and that the heart-beats remained at their normal size. It was found, however, that section of the vagi did not cause the usual increased pulse-rate. That the drug stimulates the peripheral ends of the inhibitory apparatus was, however, determined by the previous administration of a large dose of atropine sufficient to paralyze these filaments, when it was found that the colchiceine was incapable of increasing the cardiac rate."

The author, therefore, concludes that while colchicine has scarcely any effect on the circulation, colchiceine stimulates the peripheral vagi, but does not depress the heart-muscle. In this connection also it is to be regretted that the author has not published a larger number of experiments. Experiment 14, in which the pulse was increased from 186 to 258 within five minutes after the injection of colchiceine and after previous administration of atropine, scarcely warrants the statement that under these circumstances "colchiceine was incapable of increasing the cardiac rate." It is to be regretted that the author has not published a larger number of experiments in detail, for he seems to have been especially

unfortunate in his selection of examples, since, taken individually, they appear to prove the direct opposite of his conclusions.

THE THERAPEUTIC ACTION OF THE BROMIDE OF RUBIDIUM AND AMMONIUM.

STARTING with the idea that the activity of the bromides in alkaline combination is in proportion to the atomic weight of the base, Professor Laufenauer, in *Wiener Medizinische Wochenschrift*, July 13, 1889, was led to experiment with the combinations of bromine with rubidium and cæsium, of which, as yet, only the first has been employed in his studies. On account of the greater readiness in its manufacture, and thus its consequent greater cheapness, the author did not employ the pure bromide of rubidium, but its mixture with bromide of ammonium.

In this connection we may quote the statements of Botkine, already published in the THERAPEUTIC GAZETTE, p 629, 1888, as to the analogy between the action of salts of potassium, lithium, rubidium, and cæsium. It was there mentioned that the difference between the action of the salts of these different bases and those of potassium is in most respects purely quantitative, the salts of rubidium acting more energetically than those of cæsium, and more nearly approaching in their action the salts of potassium. This was, perhaps, to be expected from the fact that potassium, lithium, rubidium, and cæsium have been placed in the same chemical group, and we would, therefore, expect, if physiological action depends upon chemical analogy, that the salts of this group would act in the same manner.

The bromide of rubidium and ammonium is a white or slightly yellowish crystalline powder, with a taste that is at first slightly alkaline, but later bitter and salty. It is readily soluble in water. Its formula is, $RbBr_3(NH_4)Br$. The remedy was employed in twenty-two cases, of which twelve were cases of epileptic psychosis, five cases of genuine epilepsy, two of hysteria, one of syphilis of the brain, one of tabetic paralysis, and one healthy individual, who was employed as a test case. In the epileptic cases, in thirteen instances, the number, quality, and duration of the attacks were favorably influenced, quite as favorably, in fact, as was the case with the other three bromide preparations. As a rule, the action of the bromide of ammonium and rubidium was about equal to that of the bromide of potassium in these cases; indeed, it is claimed to have exerted a more favorable action than that of any other bromine preparation.

From the small number of cases observed, however, the author does not claim that he has positively established the value of this substance as a remedy. But his results are sufficiently encouraging to render further investigations highly desirable. Doses of 60 to 75 grains in the evening as a hypnotic and sedative gave satisfactory results. No unpleasant after-effects were ever noticed. He administered the drug in solution in water, with a little lemon syrup, in quantities of from 30 to 120 grains in the twenty-four hours.

Professor Laufenauer contributes a second paper on this same subject to the *Therapeutische Monatshefte* for August, 1889. The author states that he was led to the undertaking of this investigation by the fact that of the three alkaline metallic bases (potassium, sodium, and lithium) potassium is the most positive and lithium the least positive element; while, further, the potassium has the greatest atomic weight (39.04), while lithium has the smallest (7.01). He therefore draws the conclusion that the activity of these metallic bromides is in direct relationship to their positiveness and atomic weight. If this assumption be true, it would be likewise probable that, if we could form a bromine combination with an alkaline metallic base possessing a higher atomic weight than potassium, that the combination would possess greater therapeutic activity than the potassium bromide. Such metallic bases are found in rubidium and cæsium which have an atomic weight of 85.2 and 132.5 respectively. Professor Laufenauer states that he obtained five hundred grains of the pure rubidium bromide, and he tested the action of this salt on an epileptic boy, 14 years of age, who, while under observation for ten days under treatment, averaged two to three convulsive attacks each day. The rubidium bromide was then administered, commencing with 7½ grains daily, and increasing each day 7½ grains, until, finally, 30 grains were given daily, and continued until the supply of the medicine was exhausted. No influence whatever on the epileptic convulsions was apparent,—a fact which the author thinks might possibly have been attributable to the small doses and short duration of treatment necessitated by the limited supply of the drug.

From the great cost of the pure rubidium bromide, as we have already mentioned, the author was led to employ bromide of rubidium and ammonium.

If the author's conclusions are reliable, he is to be congratulated in having introduced another remedy for epilepsy. The author does not state whether the drug might be tolerated when the potassium salt has to be suspended, a fact which is barely possible, and which would greatly add to the value of the remedy.

CHLORALAMIDE.

TESTIMONY as to the value of chloralamide continues to accumulate. Hagemann and Strauss (*Berliner Klin. Wochenschrift*, No. 33, 1889), testing its use on six healthy individuals, found, as the only result, that in doses of from 15 to 60 grains, the sleep was about two hours longer than usual, and, on awaking, the persons felt perfectly natural, although two complained that slight headache was produced by it. These authors have nearly always succeeded in producing sleep within half an hour with a dose of 15 grains, and they advise that the use of this remedy should commence with this dose. They believe that its action in general is satisfactory, although they have met with several cases in which it proved without value.

The most careful study of the action of chloralamide is that of Dr. Eugen Kny, which was published in the *Therapeutische Monatshefte* for August, 1889. Dr. Kny states that he has been experimenting with this drug since the commencement of the year, inaugurating his studies with a number of experiments made on rabbits and frogs. Given in doses of from ⅓ to ½ grain, injected hypodermically in frogs, a condition of apparent sleep was produced, in which the reflexes, although not entirely suppressed, were greatly reduced, entire recovery occurring within two or three days. Rabbits which received 24 to 30 grains of chloralamide in the stomach fell asleep within twenty to twenty-five minutes, and after ten or twelve hours were again perfectly normal. After thus determining that chloralamide possesses the powers of a hypnotic, Dr. Kny's experiments were then first directed as to the influence of this substance on the circulation, since the greatest drawback attending chloral, otherwise so useful as a hypnotic, is its depressing action on the heart. From experiments made on rabbits in this connection the author determined that in comparison to chloral the influence of chloralamide on the blood-pressure is insignificant. Thus, in the author's experiments, the effect of chloral introduced into the stomach was to reduce the blood-pressure in the rabbit from fifty to eighty millimetres below the level before the experiment; while chloralamide, on the other hand, only produced a fall of seventeen millimetres, or not more than might be expected to occur in normal sleep.

Passing from these experiments to studies made on man, Dr. Kny publishes notes of thirty-one cases in which more than one hundred doses of chloralamide were given for insomnia, each dose varying from 25 to 60 grains. As the author's purpose was to compare the action of chloralamide and chloral, only those forms of insomnia were selected in which it had been already determined that chloral gave the best results; in other words, cases of simple insomnia. Thus, in a case of violent delirium, both chloral and chloralamide failed; on the other hand, in a long list of cases of nervous origin, not characterized by excessive excitement, the results attained were quite as good as followed the use of chloral. This also applies to two cases of chronic alcoholism, and to a patient, addicted to morphine, who was suffering from tabes dorsalis; in cases of insomnia from organic affections, such as occur in phthisis, pleurisy, three cases of heart-disease, and four patients with moderately severe neuralgia, chloralamide succeeded in overcoming insomnia. Dr. Kny claims that chloralamide may be given without danger to old people; but, as is the case with chloral in severe forms of peripheral irritation, or in violent cough, severe headache, or intercostal neuralgia, but little relief may be expected. Dr. Kny also places the effectiveness of chloralamide, as compared with chloral, as thirty grains of the latter to forty-five grains of the former. Its action is also somewhat tardy, twenty to forty minutes, or an average of half an hour, being required to produce decided effect; while the influence of chloral is usually perceptible in fifteen minutes. The sleep produced by chloralamide is deeper than that of chloral, and will vary, according to individual peculiarities, from six to ten hours, the patient waking in the morning with clear head and free from any digestive disturbance. In this latter property the author finds the chief recommendation for chloralamide; in other words, that it has practically no influence

on the mucous membranes. Thus, even when placed in ten per cent. solution on the conjunctiva, it has no effect; while a similar solution of chloral will produce severe congestion. This relative freedom from irritating properties may also be seen in comparing the taste of the two substances, for the latter is so free from any disagreeable taste that it may be readily taken in powder form, even without being surrounded by capsules. A favorite method with the author is to administer it in red wine, to which a little sugar has been added. More important than these advantages, in our opinion, is the absence of any influence on the heart produced from the administration of chloralamide. If these statements as to its freedom from danger, and activity as a hypnotic, are confirmed, chloralamide is certainly a valuable addition to our armamentarium.

The action of chloralamide is explained by Dr. Kny as due to the fact that from the free alkali of the circulating blood the chloralamide is gradually split up into chloral and formamide, and thus but small quantities of chloral become effective at any one time. This statement, the author informs us, is confirmed by the fact that he was able to detect large amounts of uro-chloralic acid in the urine of a dog which had taken 180 grains of chloralamide. Further, a point which seems to be in favor of the use of chloralamide, is that formamide acts as a stimulant to the vaso-motor centre in the medulla, and thus tends to elevate blood-pressure. Dr. Kny prefers chloralamide to sulphonal principally upon the testimony of the patients themselves, and upon the fact that it is much more rapid in its action.

Some observations which have recently been made in the Clinic for Nervous Diseases at Halle seem to indicate that doses of 45 grains of chloralamide cannot be exceeded without leading to unpleasant effects. Two young women, in a perfect state of health, each received at four o'clock in the afternoon 60 grains of chloralamide. Within an hour each complained of dizziness. In one a condition closely resembling intoxication was produced, great excitement, and continuous talkativeness, while the other complained of unpleasant giddiness and staggering, with headache, especially in the posterior part of the head, nausea, and inclination to vomit. The greatest intensity of these unpleasant symptoms was reached about three hours after the administration of the drug. In one of the cases the stomach was washed out, and found to be entirely empty, although this procedure did not succeed in arresting nausea. With the exception of some slight increase in frequency, there was no change in the pulse worthy of mention; and the next day, with the exception of slight dizziness and moderate pain in the back of the head, all the above symptoms have disappeared. These cases appear to show that only in exceptional instances should the dose exceed 45 grains. In other respects the studies made in one hundred and ninety-six different instances in the clinic on forty-one different patients appeared to warrant the conclusion that chloralamide is a valuable addition to our list of remedies. That in many cases, especially in simple insomnia, it will produce a good sleep without any hurtful influence upon the circulation, respiration, or digestion, and with relatively slight unpleasant subjective after-effects, while on account of its freedom from disagreeable taste it is readily administered. It is not, however, to be regarded as a hypnotic which will invariably succeed in producing sleep, since, in many instances, it may entirely fail, in others the sleep may be very late in making its appearance, while, finally, in certain cases, and with large doses, the after-effects are decidedly annoying.

THE BLOOD-TAX OF INDIA.

RECENT official publications of the government of India show that last year five-and-twenty thousand human beings were killed by snakes and wild beasts out of a population of about two hundred million. This number is in accord with the past, and may be looked upon as a regular life-charge upon the country. Human life is so cheap in India, however, that perhaps the destruction of property is more felt by the natives. Thus, in 1887, more than sixty thousand head of cattle were destroyed.

The snake is the chief enemy to the human animal, killing annually about twenty thousand people. Of the wild beasts, the tigers and leopards are estimated together to kill about twelve thousand people and fifty thousand cattle, the higher game being especially the food of the bigger cat. Most of the snake-poisoning is the result of an accident. The serpent strikes when trodden on or otherwise interfered with, and is rarely the first aggressor. But one snake—the *Ophiophagus Elaps*, of India—assails and charges man even more savagely and actively than does the tiger himself.

A feeling of blame against the British rulers is the first emotion which such statistics as these give origin to when read; but the problem is so complex and difficult that its present solution seems impossible. The tiger and leopard ought to be exterminated, although some English lovers of sport urge that they should in fact be protected, and that there should be a "close time" when killing of them should be unlawful; but the chief difficulty is with the snake. He permeates the land,—denizen not only of forest, jungle, and hill-side, he haunts the cities, nestles in the habitations of men and beasts, roams over fields, roads, and gardens,—an ever-present spectre of death. Only by a determined, persistent uprising and continuing battle of a whole people could his numbers be distinctly lessened. But in some places the old serpent-worship lingers, and the Hindoo greets the snake rather as a friend, or honors him as a guest, to be reverenced as well as feared.

Sir Joseph Fayrer believes that there ought to be a special governmental department having charge of this matter, although he himself writes, "The people should bestir themselves." The apathy of the Hindoo seems, however, unconquerable. The tiger and leopard eat the Hindoo, his family, his cattle; the bear and wild boar assault him; the wolf, the cowardly hyena, and the mere jackal lie in wait for his children and other feeble folk, while every hour of the day and the night the snake strikes him with speedy and certain death. Yet he bows his head as though helpless and doomed of the gods. The Anglo-Saxon energy may, perhaps, be able to awake him, but we very much doubt it. Is it also not possible that the terrible struggle for the mere necessities of life in which the Hindoos pass their existence, has engendered a sort of race instinct that the land is so overcrowded that death of individuals is better for the mass, and so infanticide is encouraged and the annual tribute to the minotaur of wild beasts paid with indifference if not with willingness.

ANTIPYRIN IN DIABETES INSIPIDUS.

SINCE the publication of a note by Eichhorst, who reported the case of a man, 38 years of age, suffering from diabetes insipidus, in whom the daily amount of urine was reduced from thirteen quarts to normal by the administration of seventy-five grains of antipyrin daily, the value of this remedy in diabetes insipidus has been the subject of considerable discussion, and in the THERAPEUTIC GAZETTE for June 15, 1889, we alluded, in discussing the value of antipyrin in diabetes mellitus, to the fact that the remedy had also been claimed to reduce the renal secretion in diabetes insipidus. The usefulness of antipyrin in the latter affection has been still further strengthened by the report of three cases published by Dr. M. Opitz in the *Deutsche Medicinische Wochenschrift* for August 8, 1889. These cases show that after the prolonged but fruitless employment of numerous other remedies the subjective symptoms of diabetes insipidus, as well as the amount of urine eliminated, yielded to the administration of antipyrin. In one of these cases a permanent cure was said to be obtained; in another the cure persisted some time after the suspension of the drug; while in the third case the amount of urine returned to its original volume after the cessation of the use of antipyrin, but was again reduced to normal when the drug was readministered. With this reduction in the amount of urine secreted there was decrease in thirst, improvement in the general feelings, increase in the body-weight, and undisturbed sleep returned. These cases seem to show that the result was directly attributable to the antipyrin, for in one case the disease had lasted more than twenty years, and had been rebellious to the most varied forms of medication, while in another the amount of urine eliminated daily reached the enormous quantity of sixteen quarts, and was yet cured by the use of the drug.

THE THERAPEUTIC AND PHYSIOLOGICAL ACTION OF URALIUM.

IN the THERAPEUTIC GAZETTE for May 15, 1889, we referred to the claim advanced by Dr. Poppi as to the value of a combination of chloral and urethan as a hypnotic. The author has continued his researches, and communicates his results to the *Pharmaceutische Post* for July 14, 1889. According to the author uralium is formed as follows:

The compound occurs in the form of bitter crystals, readily soluble in alcohol, and with difficulty soluble in water, and in doses of from 12 to 14 grains for every two pounds of

body weight, given by the mouth to dogs, almost invariably produces sleep within one or two hours, lasting for from five to ten hours. In these doses the pulse is increased in frequency, while the temperature is reduced from 2½° to 3½° F.

The author states that uralium is less dangerous than chloral, from the fact that it reduces the temperature to a less degree, and has scarcely any influence on the vascular system. He has experimented with this remedy on himself, taking from 15 to 30 grains in the evening, his pulse being increased only from 75 beats to 80 in the minute.

There was marked somnolence, but the duration of the sleep produced was no longer than usual, and on awakening there was a slight sensation of fatigue, which, however, rapidly disappeared.

Finally, the author states that he has given uralium to a large number of cases (inebriates, phthisical cases, and cases of heart-disease, and various affections of the nervous system) in doses of from 30 to 45 grains, and has almost invariably succeeded in producing sleep.

Under its use, even when repeated on a number of different occasions, the blood-pressure was not reduced either in healthy individuals or in patients to whom it was given to overcome insomnia, an attribute which is certainly in its favor when compared to chloral.

ESERIDINE AS A LAXATIVE

ESERIDINE in chemical composition closely approaches its congener eserine or physostigmine, into which it may be transformed under the influence of heat and weak acids. According to the *Journal de Médecine de Paris*, July 14, 1889, in medicinal doses it produces marked diarrhœa, without any appreciable action on the central nerve system. Its poisonous doses are six times larger than that of eserine, while it is claimed to act as a reliable laxative in therapeutic doses.

Reports on Therapeutic Progress.

THE TREATMENT OF CHOREA BY PROLONGED SLEEP.

It is well known that almost invariably the movements of chorea are arrested during sleep, so indicating a simultaneous arrest of the disordered action of the nervous centres upon which these movements depend. By greatly prolonging this period of rest we may accomplish two things,—first, we may cut short the mischief which is almost inevitably being done to nerve-centres by the maintenance of this incessant and unnatural activity; and, secondly, during such periods of prolonged rest we afford an opportunity for the gradual abatement of the functional perversion in certain parts of the nervous system (wheresoever situated) which has been the primary cause of the malady. Such a restoration of the normal equilibrium of functions, under the influence, as our forefathers would say, of the *vis medicatrix naturæ*, is the main object of this method of treatment. It is a mode of treatment which is, however, applicable only to certain aggravated cases of chorea. From the point of view of etiology and of symptoms chorea and hysteria are sometimes closely related, and a case reported by DR. H. CHARLTON BASTIAN in the *Lancet* for July 13, 1889, presents many points suggestive of the existence of a hysterical factor, especially in its initial stages.

The patient was a nursemaid, aged 20, who came under Dr. Bastian's treatment, complaining of general and severe choreic movements, and of headache and pains in other parts of the body. The choreiform movements only commenced about eight months before the patient came under Dr. Bastian's care, but there was a history of fainting attacks and giddiness for five years before, dating from a severe fright to which she had been subjected about that time. The chorea came on in the evening of a day on which she had been out with the "Salvation Army,"—a fact which still further points to the analogy between this affection and hysteria. She had been under treatment by massage and galvanism, her head and back sprayed with ether to relieve the pains, but no permanent relief was obtained. When she was admitted to the University Hospital, under Dr. Bastian's care, she stated she had never been so bad before. The patient at that time, while lying in bed, had a peculiar expression of face, the eyelids twitching when she looks up, which is seldom, and only for an instant when spoken to; the cheeks are somewhat flushed, and the lips move naturally in speaking. There is no paralysis of any face muscle or eye muscle. The mucous membranes generally have a healthy color. The skin is rather moist. The patient is generally well nourished. Usual temperature in the mouth, 99°. The movements, as she lies in bed, affect both hands and arms, as well as both legs. Those in the right hand are the most marked, and those in

the right leg the least of all, the latter being at times scarcely noticeable. When she attempts to stand or walk (which is scarcely possible even with assistance) the movements become general and very violent, even the head being moved up and down by the neck muscles. The movements are increased when she is being watched, but never cease at any time when she is awake. During sleep, as a rule, they cease entirely, though once or twice a slight tremor has been noticed. By an effort of the will the movements can be slightly lessened; they are all rapid, regular, and rhythmical. The movements of the hand consist of rapid flexions and extensions of the fingers (the general position being one of slight flexion), with adduction and abduction of the thumb. These are accompanied by rapid and more marked flexions of the wrist, less extensive but equally rapid flexions of the elbow, and when she is excited slight movements also at the shoulder, abducting and adducting the arm. All the movements of the hands and arms increase in violence when the patient sits up or when she puts out her tongue. The movements in the legs are present at the hip, knee, and ankle, and consist of rapid flexions of each. The general position of the hip and knee is one of very slight flexion, and this is much more marked in the left than in the right leg. Headache is almost continuous, dull, but with occasional exacerbations, usually frontal, though sometimes it is occipital. There has never been any vomiting, and only occasional nausea. The pain in the lumbar region is a dull aching, as is also the pain in the left iliac region. There is tenderness on pressure in both these places. Sleep is bad, and has been so for months, except after a night draught. Her mind is clear, and her memory seems good. The sight is fairly good, but the visual field is concentrically narrowed in both eyes. Pupils equal, of medium size, reacting to light and accommodation. The ophthalmoscope reveals nothing abnormal. There is no anæsthesia or rigidity anywhere. Both knee-jerks are somewhat exaggerated. A marked *tache cérébrale* is obtainable on the abdomen. The patient has been subject to shortness of breath on exertion, and palpitation when excited. The heart's apex-beat can be felt in the fifth space. There are no cardiac murmurs, the sounds being normal. Pulse regular, from 100 to 108 per minute. No cough. Voice natural. Respirations rapid, more especially when they are being counted,—48 per minute. Percussion-note good all over the lungs. Nothing abnormal in the respiratory sounds anywhere. Tongue pretty clean. Occasionally there is a little feeling of nausea; no vomiting. Appetite shortly after admission good. Bowels very constipated, never open without medicine, and sometimes requiring an enema as well. There is pain in the epigastrium sometimes soon after taking food. Menstruation began at the age of twelve; it was never regular, and the patient has not menstruated for the last seven months. Previously the flow had frequently lasted for two months. Her urine contains neither albumen nor sugar.

Synopsis of Notes concerning Management and Progress of Case.—The patient, being admitted on February 25, was kept at rest in bed. On February 27 she was ordered a mixture containing four minims of liquor arsenicalis, fifteen grains of bromide of potassium, and ten minims of spirits of chloroform in an ounce of water, to be taken three times a day; also, a five-grain pill of aloes and myrrh every morning. At the end of a week from admission there was almost no improvement. On March 4 she was prescribed twenty grains of chloral hydrate and ten grains of bromide of potassium, to be repeated on awaking; the patient to be allowed only half an hour awake at a time for the taking of nourishment; the sleeping draught to be used as seldom as possible. At first the draught was required every four hours; later on, sometimes the patient slept eight hours without awaking, but on an average she was given it every six hours. The light near the patient was lessened, screens were drawn round the bed, and quiet was observed as far as possible. Her food was beef-tea or mutton-broth, about a pint and a half, milk about the same amount, and usually two eggs beaten up with the latter, during the twenty-four hours. To relieve the constipation, 45 minims of the liquid extract of cascara were given every night, with (if needed) an enema in the morning. (The bromide was added to the chloral on the second day to relieve the headache she complained of on awaking.) During the sleep thus induced the patient's tremor ceased, except when some noise disturbed her a little, though once or twice slight movements of her knee and hand were seen when the ward was quite quiet. These movements during sleep grew rarer towards the end of the fortnight. In her waking intervals, which sometimes exceeded half an hour, but which were kept as nearly as possible to that time, the movements of all the limbs became gradually less; but she complained greatly of headache, especially if any light fell upon her eyes. She was also very emotional, crying at times. But she took

her food well, and the medicine kept her bowels fairly regular. Her temperature varied during this sleep from 99.6° to 95.4° (the latter temperature only being registered once at about 2 A.M.). Her pulse varied from 70 to 102, and her respirations from 20 to 52.

March 18.—She was allowed to awake. The movements were distinctly less marked and extensive. She complained much of headache, and was ordered some medicine for its relief. Her breathing was rapid and shallow, 60 per minute; her pulse regular, 84, rather compressible. On the 25th, the patient's headache being better, although the pain in the epigastrium and back remained, sleep was again induced as before. Her appetite remained good. The movements during the waking intervals grew less and less, and the headache was not so severe as it had been previously. During this second sleep, which was of three weeks' duration, her temperature varied from 96.7° to 99.6°, her pulse from 70 to 114, and her respirations from 30 to 60. These records as to pulse and respiration (like those previously given) apply to the brief waking intervals; but during this second period observations were also made as to pulse and respiration while the patient was actually asleep. Both were found to be distinctly slower and more natural at these times than they were during the waking intervals. Thus, the average of sixteen observations of this kind gives for the pulse 70, and for respirations 30. It should be recollected, moreover, that during the first week of her stay in the hospital, before she was put upon the chloral treatment, her pulse was mostly 100 to 108, and her respirations 48.

April 16.—She was again allowed to awake. The movements in the legs were gone, except very slight tremors now and then. The hands also were much quieter; the left almost quite still, except on excitement. Pain still felt in stomach and back. Headache still rather bad. Appetite not very good. Bowels regular. Her mental condition was confused; she cried and made unfounded statements. She was in consequence ordered a mixture, consisting of fifteen minims of nepenthe, twenty minims of orange tincture, and an ounce of compound infusion of gentian three times a day. This disturbed mental condition lasted more or less for thirteen days. She cried and was often much depressed, imagining that she had committed great fault when she first came to the hospital. She also had fancies at times that others were talking and plotting against her. During this period, however, she menstruated, so that the mental disturbance may have been intensified and prolonged by this cause. On the 29th she was mentally clear and cheerful, but unable to recollect what had happened during the previous week. On May 8 she was quite cheerful; could walk, though not quite steadily; and could knit easily, tremor existing only to a slight extent in the right hand. Bowels regular; appetite good.

She slowly improved during the next fortnight, when she was discharged with slight tremor in the right hand only. During the whole time she was asleep her general nutrition was well maintained; her cheeks and lips continued of good color; there was no sickness. Her tongue remained quite clean throughout, and she took her food well. The urine and motions were passed into a bed-pan, and there was never any incontinence.

Dr. Bastian said that, during the last twelve years, he has treated some eight or nine cases of chorea in this manner, some being notably improved, other very chronic cases, however, not deriving from it much permanent benefit. In no case, however, has any evil resulted from the treatment, and, up to the present instance, he writes, that he has never heard patients complain of headache during its continuance, and he has consequently never before had occasion to give bromide of potassium in combination with the chloral. The record of this case appears to show that no harmful effects were exercised upon the patient by the large quantities of chloral which she had taken in order to maintain sleep during these two periods of two and three weeks respectively.

In deciding as to the class of cases in which this treatment might be considered advisable, Dr. Bastian states, in the first place, that in ordinary cases of chorea, he never thinks of having recourse to it. With rest and various kinds of treatment, in the course of six to twelve weeks, such cases recover. Then, again, in the most acute and severe cases of chorea, in which the temperature is raised, and the movements are violent and continuous, with or without delirium or maniacal symptoms, he has never yet tried this mode of treatment, and should not recommend its adoption. Dr. Bastian thinks that this plan of treatment is especially applicable to the class in which there is no fever and no heart-disease, but where the movements are unusually severe and continuous, and have so continued for months and years without abatement. A hysterical element is no contraindication to the employment of this treatment, provided the movements cease absolutely during sleep.

Nothing of a curative nature can be attached to the use of the chloral. Paraldehyde might otherwise be suitable, but it is too nauseous to the taste. Sulphonal might, however, prove as efficacious as chloral. Whichever medicine be used, however, the great object should be to give no more than is absolutely needed to maintain the continuous sleep, and therefore all accessary means, such as quietude, slightly darkening the room, the expeditious administration of fluid nourishment five or six times a day whenever the patient awakes, and the use of the bed-pan, should be had recourse to. The period in which the patient is awake should, as far as possible, not exceed half an hour at a time.

KOUMISS, KÉFIR, AND MATZOON.

The various preparations of fermented milk are being now so generally used, that we reprint in full a paper recently published by MR. AD. TSCHEPPE in the *American Druggist.*

KOUMISS is generally designated as fermented milk. As this term implies the meaning of alcoholic fermentation, the definition is incorrect, since lactic fermentation has as much share in shaping the final result, by acting on both the proteid substances and sugar, as vinous fermentation does. It is not even the sugar contained in the milk which is attacked by the ferment which induces alcoholic fermentation, for the product of its fermentation is furnished by sugar foreign to milk, purposely added to it. Koumiss may, therefore, more properly be defined as being obtained by alcoholic fermentation of sugar, not *of* milk, but *in* milk.

The various phases of the process which take place in the formation of koumiss, and the changes which the constituents of milk must undergo, may be thus briefly stated:

Some sugar is added to milk, then brewers' or cake yeast (grocers' yeast), and the mixture is left to itself. In the course of time, varying in length according to temperature, the effects of alcoholic and of lactic fermentation make themselves apparent, the first by evolution of gas, through the splitting up of some of the sugar into alcohol and carbonic acid, of which the latter is the most conspicuous; the lactic fermentation, by the appearance of lactic acid, generated through a rearrangement of the atoms in the sugar molecule, and in the influence of lactic ferment, which transformation manifests itself by throwing the casein out of solution.

While albumen may be considerably acidulated without losing its solubility, casein, as an alkali-proteid, is soluble only in slightly alkaline solutions, and is extremely sensible, in this respect, towards acids. If lactic fermentation is so far progressed that neutrality is passed, the casein is thrown out as a coherent jelly, which, when undisturbed, becomes more compact by contraction and expulsion of serum, and finally conglomerates into separate fibrous lumps, which cannot be divided any more. But if this gelatinous precipitate is agitated ever so slightly in the incipient stages of its formation, it is readily broken up into an impalpable cream, which may be kept finely suspended in the liquid for a length of time, if the necessary conditions of temperature are observed.

If the generation of carbonic acid gas has been lively enough before the lactic fermentation produces its effects, or if it is aided by occasional shaking of the bottles, all the butter-fat is enveloped in the precipitate of the casein without affecting its divisibility. Hence the function of the carbonic acid gas is this, that by the expansion and mobility due to its gaseous nature, it reduces the casein to the finest possible condition, much finer than other mechanical means can do. When the precipitation and division of the casein are effected, and enough carbonic acid gas is found to cause lively effervescence, the koumiss is ready for use. The time in which this is accomplished depends on conditions of temperature at which the fermentation takes place, and on the proportions of the additions. Upon the observance of the most favorable conditions depends also the quality of the product, and it is here where the formula and the directions given in the National Formulary need a correction, in order to obtain an irreproachable preparation of koumiss.

A. *Addition of Sugar.*—Milk-sugar is not readily attacked by yeast. Contrary to statements in books that vinous fermentation will set in after the milk turns sour, and that thereby the milk-sugar becomes changed into glucose, I find that milk more easily enters fermentation under an addition of an alkali, by which the souring is prevented. The same is the case with cane-sugar; and, as it is desirable to have the alcoholic fermentation started before the lactic fermentation acts on the casein, the addition of fermentable sugar, in the shape of grape-sugar

or honey, is indicated. Its quantity must be regulated according to requirements only. Nothing is more annoying to the unwary consumer than the opening of a bottle of overcharged koumiss, which generally results in the spattering of its contents promiscuously about the room. The quantity prescribed in the National Formulary for two pints of milk is amply sufficient for two gallons, and may only be increased for koumiss dispensed in patent bottles, or if drawn from ordinary bottles by means of a tap.

B. *Temperature.*—The temperature prescribed in the formula may turn out to be disastrous in the manufacture of koumiss.

Milk is a peculiarly complex preparation. It is not an emulsion, as sometimes stated in books, but contains the fat enclosed in separate cells, which rises to the surface as a layer of cream if milk is left in undisturbed repose or subjected to centrifugal force. Boiling does not burst these cells or separate the fat; but if milk is left for hours at a temperature above the melting-point of butter-fat, 65° F., or if subjected to violent commotion, such as churning at the same temperature for a short time, practically all the fat is separated. Again, if casein is precipitated from fresh milk by means of acids, at any temperature, it encloses all the fat in its meshes, and also the jelliform casein separated from the milk by rennet includes the butter firmly. But if milk is allowed to turn sour, the fat separates from the casein readily by keeping it a short time at temperatures above the melting-point of the butter-fat. At the same time the finely-divided casein conglomerates into more compact lumps, and the koumiss is spoiled.

Although milk, as long as it is sweet, may be kept at 90° F. with impunity, this same temperature is deleterious to the product after souring sets in. The casein turns lumpy, and the fat may be seen floating in the neck of the bottle as a yellow mass. This temperature is unnecessary for the manufacture of koumiss. Vinous fermentation takes place at much lower temperatures, and the higher degrees only favor the lactic fermentation by which the koumiss gets too acid to be drunk by the bottleful.

The sugar is not all consumed by either kind of fermentation. If milk is allowed to turn sour, only one-tenth to one-eighth part of its sugar is changed to lactic acid, and also the vinous fermentation stops before all the sugar is used up. But the lactic fermentation goes on slowly, acting on the sugar which is left, and the koumiss turns more and more acid the longer it is kept. Pretty old samples of koumiss still react on Fehling's solutions.

In place of preparing koumiss with sweet milk, and waiting until it turns sour, the casein may be precipitated at once, by the addition of one-third of ready koumiss to fresh milk. Yeast is not necessary, but sugar must be added to produce enough carbonic acid gas to cause effervescence.

Koumiss may be also made from sour milk, freed of its crust of cream, by breaking up the gelatinous mass by vigorous concussion, and causing alcoholic fermentation by addition of sugar and yeast. This preparation would be nearly devoid of cream, but a proportion may be brought in by addition of sweet milk.

The time in which koumiss becomes ready for use depends as much on the quantity and activity of the ferment as on the temperature. With plenty of yeast and a prevailing temperature nearer to 90° than 60° F., the course of fermentation may be said to be even stormy, and the process is completed in as many hours as days may be consumed when the temperature is kept lower. But it is safer to operate at a lower temperature, by which a much finer product is obtained. Besides, by a slow after-fermentation the koumiss becomes ripened, and in the course of one or two weeks a cheesy or butyraceous flavor is acquired, which is generally regarded as a necessary characteristic of good koumiss.

Commercial preparations of koumiss never correspond to fully undiluted milk. Koumiss made from undiluted milk is too rich, and requires too great care to be practicably handled by the large manufacturer. But the pharmacist, who disposes of his own production directly to the customer, may easily take the necessary precautions against disastrous influences, and may give his customers the benefit of an undiluted preparation, which koumiss is supposed to be.

Samples of commercial preparations of koumiss I found to be either more or less deficient in cream, or to be made from watered milk, or both. Dr. Brushe's koumiss, for instance, commanding the largest sale in New York, gave, on analysis, only two-thirds of the casein and fat in the proportions in which they exist in milk, indicating a corresponding watering of the milk.

KÉFIR.—This is a fermented milk beverage, identical with koumiss in its finished state. It differs from the latter by being

produced by aid of a different ferment. The kéfir ferment was originally brought from the Caucasus, but may be procured in this market from home culture. It comes in the shape of grains of various forms and sizes, very much resembling bits of the inflorescence of cauliflower, constituting a compound fungus growth, resulting from the cohabitation of a fleshy fungus with a certain species of saccharomyces, which latter alone plays the active *rôle* of enacting vinous fermentation of the saccharine constituent of milk. This peculiar saccharomyces differs from the brewer's yeast by starting vinous fermentation without addition of a fermentable sugar, and fermentation progresses to a certain advanced degree while the milk is yet sweet, or before lactic fermentation produces its effect. It is, therefore, possible, to obtain an effervescing koumiss by its aid with a much less degree of acidity than that obtained by the saccharomyces cerevisiæ, and it may be concluded that the kéfir yeast is better adapted for the fermentation of milk than beer yeast is. By after-fermentation the same degree of acidity is reached as in koumiss obtained through the action of ordinary yeast. This peculiarity has led to a distinction in the use of the different stages of the fermentation of kéfir, as it has been observed that young kéfir which is yet sweet acts as a slight purgative, while an older, or more acid, or "stronger" kéfir exerts a constipating effect on the bowels, and is less easily borne by delicate stomachs.

Kéfir koumiss is prepared by adding active kéfir grains to milk, preferably kept at a temperature between 70° and 80° F., until the effect of fermentation becomes apparent by the rising of the grains to the surface, being carried upward by bubbles of carbonic acid gas attached to them. The grains may then be strained off, and the milk, which now contains enough yeast-cells to insure the continuance of the fermentation, left to itself in well-corked bottles.

As the yeast-cells propagate themselves, more fresh milk may be added previous to bottling.

The directions accompanying the kéfir grains direct that the grains should be left in the milk until the casein separates from the serum, and that this strained product shall be used as the ferment of about four times its bulk of fresh milk. (Several prominent houses who sell kéfir grains accompany them by printed directions, which fail to start their activity together.)

If kéfir is once obtained by this means, the further production may be simplified in the same manner as in the case of koumiss, by adding a quantity of ready kéfir to a multiple of fresh milk, and this may be continued through many generations without having further recourse to the original kéfir grains.

The printed directions recommend the employment of milk previously boiled. The advantage of this proceeding is supposed to be this, that the lactic fermentation is retarded, to which end a washing of the kéfir grains with a two per cent. solution of carbonate of sodium is prescribed for the removal of the rest of lactic acid tenaciously retained by the grains.

Commercial kéfir grains may be found to be quite inert by the buyer uninitiated in the art of developing them properly. The fact is, that their activity must be first started, and directions to do so are given with the samples; but, in spite of following them closely, they may fail to give satisfactory results. The secret of success seems to me to be to keep the grains in fresh milk at a temperature of 70° to 80° F., and to change the milk once or twice daily, or as often as the milk threatens to become sour. The time may have to be extended to a week, until their action becomes manifest by the generation of gas.

Kéfir grains are also apt to decay, and those inert grains have to be removed. Those which retain their vitality may be recognized by their turgor or toughness to the touch, while the decayed ones crumble between the fingers like soft cheese.

The usefulness of koumiss as a dietetic hinges upon the fine division of its casein. Indeed, if a well-prepared koumiss is subjected to digestive influences, the finely-divided and diffused precipitate of casein dissolves at once, while the floccular casein, otherwise obtained, resists the peptic action remarkably long.

MATZOON.—Matzoon is a peculiar milk preparation, also stated on the label to be fermented milk, although there is no evidence of its having undergone alcoholic fermentation. It is devoid of gas, and appears as a viscid liquid, showing a rather coarsely granular mass of precipitated casein, well suspended in a serum which corresponds to that obtained from sour milk. Although betraying great richness from its appearance, the analysis gives an amount of casein as corresponding to undiluted milk and two-thirds of its cream.

One fluidounce of cow's milk contains grains (average).		Koumiss from milk.	Dr. Brushe's koumiss.	Matzoon.
Sugar	22	...	...	20
Casein	14	14	10	14
Fat	15	15	9	7
Lactic acid	...	1.5	3	.1

Glucose. Lactic acid.

$$C_6H_{12}O_6 = 2HC_3H_5O_3$$

Glucose. Alcohol.

$$C_6H_{12}O_6 = 2C_2H_6O + 2CO_2$$

Glucose yields by fermentation—

	Per cent.
Alcohol	48.5
Carbonic acid	46.5
Glycerin	3.6
Other products	1.4

THE TREATMENT OF ECZEMA.

Dr. Unna, of Hamburg, publishes in the *Monatsschrift für Dermatologie* a paper on the "Diagnosis, Etiology, and Treatment of Eczema." He says that even before the experimental cultivation of bacilli exact clinical observation had distinguished a number of entirely different types of eczema, and he thinks that each different type will be found to require a different mode of treatment. The type most frequently seen in Hamburg is seborrhœic eczema, and the parasite causing it is the same which in the first instance produces pityriasis capitis. Those persons who suffer from seborrhœic eczema of the head, including those affected with pityriasis capitis, are apt to suffer from the same kind of eczema on other parts of the skin. Dr. Unna has repeatedly pointed out that we possess a series of valuable remedies for the treatment of seborrhœic eczema in all its forms,—viz., sulphur, resorcin, chrysarobin, and pyrogallol. Of these remedies resorcin is the best, as being the least likely to produce local or general ill effects. It may also be used in an alcoholic or watery solution, or in the form of ointment, paste, soap, or powder. Dr. Unna's favorite formula is a soluion of three drachms of finely-powdered resorcin with an equal quantity of glycerin in six ounces of spirits of wine, diluted with four times the quantity of water or camomile tea. A thin layer of cotton-wool well moistened with the solution is applied, covered with some water-proof material, and fastened by a bandage. These applications are particularly useful when the treatment is prolonged, or when it is carried out by night. They are, of course, impossible in general eczema of adults, but not in that of infants. Dr. Unna describes an especially important effect following the application of resorcin,—viz., a swelling of the epidermis, by which all painful fissures are healed in a single night. In order to insure healing, he advises that the skin should be anointed after the removal of the bandage, and that washing with soap should be avoided. A few people suffer from a resorcin idiosyncrasy which necessitates the immediate cessation of this treatment, and the application of powder to the affected parts. This idiosyncrasy is, however, very rare, as he has only met with it ten times in five years' observation, during which time he has seen two thousand cases. He remarks that his treatment is not adapted to those cases of long-existing eczema, in which strongly-infiltrated or thickly-indurated patches occur.—*Lancet*, August 17, 1889.

THE THERAPEUTICS OF RHEUMATISM IN INFANTS AND CHILDREN.

At a meeting of the Medical Society of the County of New York, held May, 27, 1889, Dr. A. Jacobi, in a paper with this title, opened by calling attention to the frequency with which rheumatism occurred in children and infants (*New York Medical Journal*, August 24, 1889). Valvular affections of the left side of the heart were usually secondary to rheumatism, and not to scarlatina. Many cases of rheumatism in children did not develop cardiac symptoms; but, on the other hand, endocarditis was sometimes the first symptom of rheumatism, even in mild cases; the two facts contrasted strongly and must be borne in mind. The slightest symptom of chorea minor should lead to an examination of both heart and joints. Chorea minor due to a rheumatic affection of the spinal membranes might be, not the final, but the earliest symptom of rheumatism and rheumatic endocarditis. "Dentition," "malaria," "worms," or "colds" were too often the diagnoses given in cases of rheumatism in children. This was partly because an idea of the rare occurrence of the disease in children was rooted in the minds of many practitioners, and partly because diagnosis was sometimes quite difficult. Fever in small children was a common symptom, but every disturbance in a child was apt to raise the temperature. The elevation of temperature in rheumatism might be slight and irregular. Swelling of the joints was apt to be trifling in amount

and easily overlooked; and the pain (spontaneous or on pressure) might be much less severe than pains due to fatigue, rachitis, syphilis, colic, or otitis. In every doubtful case, where a child showed signs of discomfort, safety required that the heart and joints should be examined. Diagnosis was especially hard if only a single joint, such as the hip or knee, was affected. Other joints might become involved subsequently. But too often such a condition in a young child, requiring really careful and repeated examinations to determine correctly, was almost disregarded by the physician, and the mother was assured that the child's uneasiness was caused by "growing pains." He would emphasize the fact that in a large majority of cases the so-called "growing-pain" indicated the presence of rheumatism and the liability to irreparable heart injuries.

As regarded treatment, a change of residence from localities in which rheumatism was apparently endemic was often desirable. Alkalies were often indicated. Cold and moist weather, damp houses, etc., frequently brought on rheumatism in the children of rheumatic parents, and in such children treatment must be mainly preventive. The systematic use of cold water would modify, and sometimes entirely remove, such a tendency. A cold wash, sponge, wet sheet, shower-bath, or bath (according to the child's strength or power of reaction) should be given daily. If in any case this was followed by chilliness, then tepid water containing alcohol might be used at first. Warm clothing should always be worn for the remainder of the day after any cold-water application. Among the various local measures mentioned for the relief of swollen and painful joints, the speaker called especial attention to swathing of the part in cotton and flannel, and to the application twice daily of a solution of iodoform in collodion, brushed copiously over the swollen surface. For endocarditis, absolute rest, cold applications over the heart, and salicylate of sodium were to be recommended.

After referring to gonorrhœal articular rheumatism, nodulated rheumatism (*i.e.* the appearance of small neoplasms on tendinous and periosteal structures), and peliosis rheumatica (a localized form of purpura), which were occasionally met with, and required no special treatment in children, the speaker considered muscular rheumatism. In this form also the best preventive treatment, when a tendency to the affection had appeared, was the regular and systematic use of cold water. In certain cases the injection of a small dose of morphine, the use of the interrupted current, the administration of the salicylate, antipyrin, acetanilid, or phenacetin, and a few subcutaneous doses of $\frac{1}{12}$ grain of pilocarpine, had given relief. Where a real inflammation was present in a muscle, warm baths, a mild continued current, and small doses of the bichloride of mercury would aid in recovery.

Dr. W. H. Thomson said that many years ago his attention had been drawn to the etiology of rheumatism, he being then a medical student in Syria, and hearing from his father (then engaged in explorations) what seemed to him paradoxical statements relative to the prevalence of rheumatism among the Arabs of the desert. He had heard that acute rheumatism was as common a disease among the Arabs in the arid country south of Palestine as among the fishermen of Norway and Scotland. He had asked himself then and since what reason there should be for the appearance of a disease either identical or similar among peoples living under apparently opposite conditions of life, in respect to weather,—that is, in climates presenting the extremes of warmth and dryness and a never-clouded sky on the one hand, and incessant fog, rain, and chilly winds on the other hand. He had become satisfied that the cause of rheumatism in either case must be a common one, but not the same as the cause of gout, for gout was nowhere to be met with in Mohammedan countries, unless in the few sections where alcohol was used (as in parts of India, where a drink made from fermented rice was drunk); at least it was very rare. It was safe to premise that rheumatism, so far as climate was concerned in its causation, was connected with changes in temperature, while gout was the outcome of excesses in the diet and in the use of fermented liquors. What, then, was there in common in the conditions of life of a man living in a tent in a burning climate, never having enough water, and a fisherman on the shore of the Baltic drenched with water most of the time? He would answer, Chilling of the skin when moist. This might occur as well in the deserts of Syria as in lands covered with fog half the year round. In the desert there was great heat during the day, the sand became heated as if in an oven, and when a party of travellers lay down to sleep, some time after sundown, on this warm sand, they were in a profuse perspiration, and nat-

urally provided themselves with little in the way of coverings. But the sand radiated its heat very rapidly into the cloudless sky, and before sunrise bitter cold would succeed to the heat of the evening. Consequently the wet skins of the uncovered sleepers became badly chilled; and that rheumatism should follow such exposure was most natural. He had heard his father say that he had never suffered more from cold than just before dawn at the base of Mount Sinai.

No one should attempt to diagnosticate the early stage of rheumatism by an examination of its articular habitat, a joint. A swelling in a joint might be due to gout, trauma, gonorrhœa, or rheumatism; the symptoms in the joint were the same in each case, and so many mistakes were made. Examine the pulse, and no one familiar with the contrast presented by rheumatism and gout in this respect should fail to determine whether it was rheumatism which the patient had in the joint, or gout affecting the heart and arteries. In scarlatinal rheumatism the pulse was often hard, and there was often much uric acid present in the blood and urine; sometimes there was a formation of pus and true textural changes, which were absent in simple rheumatism, and often pyæmia was developed.

He was inclined to believe in the existence of some yet unknown function of the skin connected with respiration in its widest sense; he thought that a failure of skin-action of some sort was a means of causing the accumulation in the body of the matters which were morbific of rheumatism. Quinsy and acute articular rheumatism were sometimes associated, the latter following the appearance of the former. In the genesis of rheumatism there was usually a chilling of the skin, so naturally the warm bath acted as an anæsthetic; moreover, any bath rendered the urine alkaline,—even a vinegar bath. Flannel had a peculiar usefulness from first to last. Oily inunctions, and especially inunctions of cod-liver oil, were advisable for the same reasons. This oil had first been introduced as a remedy for chronic rheumatism, and he himself placed great reliance on its effects, both externally and internally.

As to the connection between rheumatism and endocarditis in children, he fully concurred in Dr. Jacobi's warning lest it be overlooked. Endocarditis, he wished to state emphatically, might occur with only the most insignificant indications of rheumatism. He had recently seen a fine boy suffering from only a moderate attack of arthritis with the temperature between 99° and 100°, or else normal; the disease had been contracted by sitting on the ground while watching a game of ball. In spite of all he could do, endocarditis had come on in thirty-six hours, and it would probably leave him with a permanently crippled heart.

To prevent injuries to the heart in children, contracted in this way, we must be on the lookout for the preceding rheumatism, and especially if chorea appeared, which was the normal order in the development of rheumatism in children, the articular affection coming subsequently. He dreaded "growing pains," and put a child on the use of cod-liver oil at once when they were complained of. As prophylactic measures he would advise the application of suitable oils to the skin and the wearing of flannel both summer and winter.

As regarded the therapeutics proper to a case of endocarditis, he had no faith in the power of salicylic acid, either in treatment or prevention; it was useful in articular disorders, not where the heart was involved. Antipyrin or phenacetin was preferable.

But, it might be asked, Why should the heart have this peculiar liability to develop severe lesions during an attack of rheumatism? When rheumatism invaded other parts and structures in the body it did not produce such injuries, or anything like as severe ones. If we found a joint in a state of redness, pain, and swelling such as rheumatism produced, we should say the prognosis was bad unless the attack proved to be rheumatic, for in that case the symptoms would pass away. If such a joint was examined just after death, it presented few indications, or perhaps none whatever, of the inflammatory process recently so active in it, whereas the heart did present permanent structural lesions. The explanation of this difference could be derived from a consideration of the unresting nature of the heart, and the necessarily intensified action of the rheumatic poison on the wall of a serous cavity subjected to such constant mechanical strain. If a man having rheumatism in his knee should kick a hundred and forty times in a minute, he would probably cause the development of structural changes which would remain for life; consequently, the importance of compelling the heart to beat slowly. In children the heart-beat was much more rapid than in adults; and, correspondingly, heart complications in rheumatism were more likely

to be developed. He therefore recommended full doses of aconite, and not of digitalis. Aconite allayed the irritability of the heart; also alkalies were to be given; and finally the utmost care exercised to protect the chest, so that the chilling of the sensitive cutaneous nerves should occur; especially should the chest area overlying the heart never be bared of covering.

Dr. J. Lewis Smith remarked that in thirty years of practice he had seen many cases of acute rheumatism in children. For fifteen years he had kept a record of the cases met with in the out-door department of Bellevue Hospital, in which rheumatism was developed in patients under 15 years of age. In seventy-eight of these cases there had been a cardiac bruit. As regarded age, he had not met with a single case where the patient was under 1 year old, and very few where the age was less than 2 years. In these very young patients there had been little swelling, but some tenderness in the joints. In most instances the disease in children commenced in the lower extremities—a matter of surprise to him—and tended, more or less, to travel upward. He agreed with previous speakers that in most instances the local manifestations were much less pronounced than in adults. There were many walking cases in children under 10 years of age.

As regarded "growing pains," often, after finding a cardiac bruit in a child, and questioning the mother if it had not suffered from rheumatism in the past, he had been answered that the father or the mother was subject to the disease, and that a few months previously the child had had "growing pains." It would be well to teach the laity that there was always a pathological condition behind "growing pains," and that by calling in a physician as soon as they were complained of, endocarditis and possible injury for life might be prevented. Sometimes œdema was the first pathological indication to attract attention, a swelling of the feet, shortness of breathing, and perhaps a hacking cough, being noticed before the other symptoms appeared. In one instance a child of 12 years had been brought to him suffering from lividity and coldness in the right hand and the left leg. He had soon been able to determine that the child had had a severe attack of rheumatism, and that evidently a deposit of fibrin had formed in the heart, emboli from which had lodged in the brachial and femoral arteries. The pains suffered from and the bruit were to be looked to for a diagnosis of endocarditis in children; the rheumatism which had caused it might have been latent. The heart would become enlarged after the disease had lasted more than a year. Quite often, in children, the pulse would be very rapid, showing the difficulty with which the heart was pumping the blood; for the same reason the enlargement took place.

He agreed with Dr. Jacobi that rheumatism was often the cause underlying the development of chorea minor. In one hundred and sixty-five cases of chorea minor of which he had kept a record, only eighteen had been due to rheumatism.

As to treatment, he had found the salicylate of sodium of great value if used early. He gave it internally, and also packed it around the affected joint.

Dr. H. D. Chapin remarked that while it was now recognized that rheumatism was a common disease in children, it was often difficult of diagnosis. There was no pathognomonic symptom, and we must depend on recognizing the composite picture of the disease. Wandering pains, endocarditis, hydræmia, and chorea were manifestations of one and the same condition. They might be met with together instead of following each other. If we paid attention to pain in a limb or joint without looking farther, it would be necessary to remember that not all pains were due to rheumatism. Bruises may have been received which gave no external signs; and, still more commonly, pain was due merely to muscular weariness, and especially soreness in the joints, following play. When rheumatism was present, it was even more apt to cause pain in the morning than in the evening, while pain due to the child's being tired would not, of course, be complained of in the morning. Heredity should always be given much weight.

Children having endocarditis were commonly allowed to get up too soon. He agreed with preceding speakers as to the importance of complete rest in the treatment of the affection. In fifteen or twenty out of sixty cases that he had met with, tonsillitis had appeared either before or after the rheumatic trouble. The causes of rheumatism seemed to be acidity in the stomach and bowels, derangement of the hepatic function, and a checking of the activity of the skin; in treating it, therefore, each of these factors should be kept in mind. Hot alkaline baths, a careful diet, and iron internally would often prevent the recurrence of the attack.

Dr. A. Seibert thought rheumatism in

children a disease due to infection quite as much as to heredity. He had seen it develop in young children whose parents had never suffered from it, but were attacked some time after their children. This had always occurred in families living in damp and dirty dwellings. Its infectious origin explained those cases in which endocarditis appeared before either a joint affection or chorea. He placed the disease in the same category with fibrous pneumonia, meningitis. and diphtheria; statistics had shown that it was most frequent in the same houses as the latter. He did not believe the mere chilling of the surface of the body could give rise to all the complications which attended rheumatism in children; and, moreover, young children were kept quite carefully in-doors in bad weather, and did not get exposed to cold and wet or chilling of the surface.

Dr. J. C. Peters replied to this that the houses of the poor were but too commonly damp and cold, and that children were very often the leading sufferers from this, owing to the carelessness of their mothers about their underclothes. In most of the cases he had met with it had been necessary to order better undergarments. In treatment he had found lithia (as distinguished from lithia water) of considerable value.

Dr. A. Caillé took much the same view as Dr. Seibert, believing the disease infectious, and hoping that in the new era of medical chemistry now appearing some substance would be found which would combat the poison of the disease.

THE TREATMENT OF FURUNCLES.

Staff-Surgeon Leu, of the German army, sums up a long communication to the *Deutsche Militärärztliche Zeitschrift* on the treatment of furuncles with the following conclusions. Subcutaneous injection of carbolic acid is a simple and effectual abortive treatment of furuncles. Incipient furuncles which have not yet suppurated are especially adapted for this treatment. A cure results in these cases without necrosis of connective tissue; in the more advanced furuncles which have formed pus, or even discharging it, no deforming cicatrization follows. The proper strength of the carbolic acid is three per cent. This mode of treatment is particularly valuable in the army, because it shortens the time on the sick-list (when it is necessary to put the man on at all), and he returns to duty with a better cicatrix, while many may be treated without going to hospital. The simplicity of the apparatus required, consisting only of a Pravaz syringe and a small bottle of carbolic solution, makes it possible to apply the same anywhere and at all times,—for instance, during manœuvres and on the march.—*Lancet*, August 17, 1889.

THE ACTION OF BENZOYLECGONINE.

Dr. Stockman has set forth, in two valuable papers, which have been subjected to careful review by Dr. Leech (*Medical Chronicle*, August, 1889), the results of his investigations into the nature of the active constituents of the leaves of the erythroxylon coca, on which he has been for some time engaged.

Coca leaves contain, besides cocaine, an amorphous material, which forms from twenty-five to fifty-eight per cent. of the total alkaloidal matter, and concerning which there has been a difference of opinion. According to Stockman, this uncrystallizable substance has not always the same composition; sometimes it consists of cocaine mixed with a material called hygrin, and other bodies, which prevent it crystallizing; sometimes of a mixture of alkaloids, the chief of which is called cocamine, or isatropylcocaine.

Cocaine ($C_{17}H_{21}NO_4$), chemically considered, is methyl-benzoylecgonine,—that is, benzoylecgonine ($C_{16}H_{19}NO_4$), in which an atom of hydrogen has been replaced by methyl (CH_3).

Benzoylecgonine, again, is ecgonine ($C_9H_{15}NO_3$), in which an atom of hydrogen has been replaced by benzoyl (OCC_6H_5). Ecgonine itself is formed by the introduction of β-oxypropionic acid ($C_3H_6O_3$) into a molecule of methyl-tetra-hydropyridine ($C_5H_5N(CH_3)H_3$), each body losing an atom of hydrogen in the process, while methyl-tetra-hydropyridine is pyridine plus four atoms of hydrogen, one of which has been replaced by methyl. Cocamine, or isatropylcocaine, is constituted like cocaine, except that the radicle of isatropic acid is present instead of the radicle of benzoic acid. Cocaine, when treated with acid in a sealed tube, yields ecgonine, benzoic acid, and methyl alcohol; isatropylcocaine, under similar conditions, is split up into ecgonine, isatropic acid, and methyl-alcohol.

While ecgonine is formed when cocaine is heated with an acid, benzoylecgonine may be produced by heating it in a sealed tube with water. It is probably, indeed, present in badly-packed leaves, and is readily formed

during the process necessary for the extraction of cocaine from the leaf.

As both ecgonine and benzoylecgonine are produced by the decomposition of cocaine, and as cocamine is a constituent of the leaves of erythroxylon coca, these substances may at times be present in commercial cocaine, or even substituted for it; indeed, in giving a *résumé* of observations previously made on the physiological action of this alkaloid, Dr. Stockman points out that several of the observers seem to have been led to erroneous conclusions from unwittingly employing benzoylecgonine, or cocamine, instead of cocaine. Manifestly, then, it is desirable that we should know the physiological effects of ecgonine, benzoylecgonine, and cocamine, as well as of cocaine.

Cocaine, according to Dr. Stockman's experiments, in small doses ($\frac{1}{110}$ of a grain), depresses in the frog the activity of the brain and cord. He finds no antecedent stage of excitement. An appearance of paresis of the hind limbs is induced, and there may be slight inco-ordination, but both are due to depression of the sensory rather than the motor tracts, for the animal can jump vigorously, if there be a sufficient external stimulation.

Larger doses ($\frac{1}{85}$ to $\frac{1}{28}$ of a grain) still further depress the functions of the brain and cord, sensitiveness to external stimuli decreases, and the animal lies flaccid, but the reflex movements, when excited, are exaggerated; tetanus does not occur. The frog loses its power of localizing sensory impressions and of co-ordinating movements, but stimulation of a nerve stem, by pinching, is readily felt. Eventually sensory impressions almost cease to excite reflex action, but before this stage arrives, a peculiar condition is manifest, —a pinch occasions a violent reflex movement; with a second stimulation, the reflex is less strong, and, after a third or fourth, there is no response, yet, upon resting a short time, excitability returns. The gray cells of the cord seem to be so influenced that they discharge their energy violently, but exhaust themselves rapidly. The injection of $\frac{1}{7}$ to $\frac{1}{8}$ gr. causes complete sensory and motor paralysis; $\frac{3}{4}$ to $\frac{4}{5}$ of a grain cause death; convulsions are not induced.

With small doses, neither nerves nor muscles are apparently affected, but local application of cocaine distinctly affects the nerves.

Kochs (*Cent. f. Klin. Med.*, 1886, No. 46) found that the local application of cocaine to the sciatic nerve at first prevented evidence of sensation on irritation of the skin of the same leg; while stimulation of the nerve above the point of application of the cocaine causes a good muscular contraction; hence he concluded that cocaine at first paralyzes the sensory and not the motor fibres of the nerve. But Dr. Stockman quotes some experiments of Alms, which seem to show that the conduction of sensory and motor impressions is equally lessened. He thinks, however, that after the subcutaneous injection of cocaine the conduction of impressions is chiefly interfered with in the spinal cord. Only after large doses is there distinct depression of the conducting power of the peripheral nerves.

The conducting power of the nerves seems exhausted by strong stimuli, returning after an interval of rest. The muscles are practically not affected, being only rendered slightly less excitable at the point of contact with the cocaine solution. Application of cocaine to the cord causes similar symptoms to those produced by subcutaneous injection. Small doses dilate, large doses contract, the pupil in frogs.

The action of cocaine in mammals, Dr. Stockman thinks, is intermediate between that of morphine and caffeine. In rabbits, small amounts cause quietude; after medium or large doses there is excitement, which may, in part, be due to want of control in certain parts of the brain, due to paresis, caused by the cocaine in other parts. General sensibility becomes depressed, and indications of altered sensibility precede those of motor paresis. Cocaine has a very marked analgesic effect, as well as an anæsthetic effect, and Dr. Stockman thinks that deficient conduction of sensory impressions by the cord bears a greater share in the general loss of sensibility than the narcotic effect on the brain. In mammals, convulsions may occur.

Benzoylecgonine acts like caffeine, the muscular and central nervous system being chiefly affected, the peripheral nerves not at all. The $\frac{1}{20}$ to $\frac{1}{15}$ of a grain injected into a frog causes slight muscular stiffness, followed after some days by an increase in the reflex excitability of the cord. With a larger dose ($\frac{1}{10}$ of a grain), great stiffness, and even tetanus, may occur, lasting many days. Doses of $\frac{1}{2}$ to 1 grain are always fatal, and may cause death from rapid paralysis of heart and voluntary muscles without special symptoms. The muscles round the place of injection are found in a state of rigor mortis, those at a distance are but little affected, and the peripheral nerves are not influenced. Dr.

Stockman thinks the muscles absorb the poison when injected, but that afterwards little reaches the spinal cord, hence the late supervention of spinal symptoms. The direct application of benzoylecgonine to the cord causes tetanus.

Among mammals, rabbits are very insusceptible to the action of benzoylecgonine; 30 grains only caused diarrhœa. In cats, 15 grains produced excitement, dilated pupils, increased reflexes, and diarrhœa. A large dose induced tetanus. The heart's action was but little affected till just before death, which seemed to be due to failure of respiration.

After death the muscles do not respond to stimulation, but there is marked contraction of the intestines and bladder.

Ecgonine is less poisonous than either cocaine or benzoylecgonine. In cats and rabbits, very large doses have no apparent effects, and, in the frog, 7½ grains are not always lethal. Given by the mouth or subcutaneously to a frog, ¾ of a grain slightly increase the reflexes. Larger doses cause very slight lethargy and inco-ordination, by depressing the functions of the brain and cord; later on, increased spinal excitability is noticed, which may last some days.

The muscles round about the place of injection lose their electric irritability more or less, and pass into a condition of rigor mortis, and Dr. Stockman suggests that they probably absorb the poison. When the drug is taken by the mouth, the muscles throughout the body are equally affected, and spinal symptoms come on rapidly.

Tetanus is only produced when the drug is applied directly to the spinal cord. The heart stops in diastole, and is found dilated. Ecgonine has no marked action as a local anæsthetic, nor does it affect motor nerves unless injected into the blood-supply, when it depresses the conducting power of the nerves, and causes loss of muscular excitability. There is some little difference in its action on the rana temporaria and rana esculenta, the latter being least affected.

Cocamine resembles cocaine in many of its physiological effects, but small doses ($\frac{1}{10}$ to $\frac{1}{110}$ of a grain) produce general stimulation, causing the frog to be excited and restless, faintly increasing the reflexes, and making the muscles respond more sharply to nervous impulses.

Larger doses may give rise to nervous and muscular depression, and cause unwillingness to move, and muscular stiffness. Though the spinal reflexes are increased, the cord tends to rapid exhaustion, as in the case of cocaine.

Anæsthesia is produced at place of injection, and the function of the motor nerves is slightly depressed. The pupil is dilated. The increased reflex and the rigidity last after the other symptoms have passed away.

$\frac{1}{8}$ of a grain quickly paralyzes both muscular and nervous system without primary stimulations, acting more powerfully than cocaine, and affecting the motor nerves more profoundly. The pupils are rendered small. Subcutaneously given, this dose is always fatal.

Cocamine is an active muscle-poison, and the muscles round the point of injection quickly die. The neighboring muscles pass into a condition of rigor mortis, while the most distant ones are unaffected. The heart becomes slower and feeble, usually stopping in diastole.

The muscles tend to absorb the poison, but eventually it enters the circulation slowly, and produces increase of the spinal reflexes.

Small doses excite, but large doses depress the functions of the cord, and this latter effect is produced when it is applied to the cord itself.

Cocamine causes greater reflex excitability than cocaine, and in the later stages acts more powerfully as a paralyzant both on the nervous system, nerves, and on muscle,—a small amount is lethal.

In mammals, too, it produces powerful effects; ½ to ¾ of a grain injected subcutaneously in rabbits dilates the pupil, and causes great restlessness and increase of the reflexes. This is followed by a tendency to quiescence. 1½ grains injected subcutaneously are always fatal, and may quickly kill by paralyzing the respiration.

Great muscular weakness is produced, but only slight indication of spinal excitement. The pupils are dilated, and the heart is feeble. 30 to 70 grains by the mouth cause great muscular depression but no spinal excitement.

In cats (in addition to the nervous symptoms) it causes vomiting and diarrhœa; and, immediately after death, both in cats and rabbits, peristalsis of the stomach and bowels is seen to be remarkedly energetic, both bladder and bowels being contracted. The motor nerves are never paralyzed.

Comparing the influence of the chief alkaloids of the coca plant and their derivatives, it appears that cocaine itself chiefly affects the nervous system, first as a transient depres-

sant, then as a stimulant, the action on the muscle being feeble.

Benzoylecgonine has first a stimulant action on the nervous system and muscle. Afterwards it paralyzes both. Ecgonine has a similar but much milder effect. Cocamine action resembles that of cocaine in many ways, but it exercises a profound influence on the muscle, while that of cocaine, though visible, is slight.

Hygrine, which is possibly a pyridine base, when injected under the skin of a frog, causes intense local irritation, and when applied to the tongue in man, burning and tingling.

Dr. Stockman, in conclusion, enters into some speculations as to the physiological cause of the phenomena said to arise from the use of coca leaf.

Its general sedative action is, he thinks, due to the dulling of the central nervous system to sensory stimuli. The secondary stimulant effect on the brain, and the loss of sensory conducting power in the cord explain the restfulness, apart from heaviness, said to accompany the feeling of well-being, which the coca-leaf produces.

Owing to the anæsthetic effects of its contained alkaloids, chewing the leaf dulls the feeling of hunger. Their action on the intestinal muscle prevents constipation, and, perhaps, they cause the skeletal muscles to contract better. The effect of coca alkaloids on metabolism is doubtful. It is possible, however, that cocamine, which, like caffeine, modifies the vital processes in the muscle, may effect chemical activity, so that an equal or greater amount of work can be performed with a lesser consumption of carbohydrates. This would explain its effects in increasing the endurance of fatigue by those who chew the leaf.

THE HÆMOSTATIC PROPERTIES OF ANTIPYRIN.

Almost ever since its introduction into therapeutics, antipyrin has been employed with success in the treatment of various hemorrhages, whether occurring in the form of epistaxis, metrorrhagia, purpura, or hemorrhage of traumatic origin; and a striking example of this property is published by Dr. Saint-Germain in the *Revue Mensuelle des Maladies de l'Enfance* for August, 1889. The case was one in which enormously hypertrophied tonsils were removed from a boy 14 years of age. The tonsils were removed by a bistoury and the bleeding surface vigorously mopped with a camel's-hair pencil soaked in a solution of antipyrin. Scarcely any hemorrhage whatever occurred, a fact which is attributed by the author to the hæmostatic properties of the antipyrin.

THE TREATMENT OF BURNS BY IODOFORM.

At the recent International Congress of Dermatology and Syphilography, held in August last in Paris, M. Schiff, as reported by a special correspondent of the *Medical Press and Circular* for August 28, 1889, spoke on the treatment of burns by iodoform, as advocated by M. von Mosetig-Moorhoff, which was very successful, especially in calming pain. The bullæ should first be cut away and the wounds gently washed with a very weak solution of table-salt, then several layers of iodoform gauze are placed on the burn, the whole covered with a layer of oilskin. The first dressing should not be changed before the end of the first, or even second, week. When the burn is situated on the face a pomade of iodoform of 1 in 20 should be applied, covered with oil-silk.

M. Hebra said that iodoform gave very good results in the treatment of burns *au début* before the eschars have become detached, but when that stage arrives iodoform prevents the granulations from being covered with epithelium. Resorcin, on the contrary, in a solution of one or two per cent., favors the rapid formation of epithelium.

THE TREATMENT OF PHARYNGEAL ANGINA BY THE INTERNAL ADMINISTRATION OF SALOL.

In 1888, Dr. Capart, in a clinical lecture, called attention to the almost miraculous power possessed by salol, given internally, in doses of 60 grains, in the treatment of suppurative tonsillitis; and this statement led Dr. Gouguenheim to test the value of this remedy in twenty-two different cases of various forms of inflammation of the soft palate, tonsils, and pharynx, employing doses of 45 to 60 grains, taken in three or four doses throughout the day. On account of its insolubility, the drug was simply suspended in a mucilaginous emulsion, which was subjected to thorough shaking before being administered. These cases appear to show that salol exerts the greatest influence on pharyngeal angina, whatever be its cause. The

author claims that it relieves with the greatest rapidity pain and dysphagia, while shortening the duration of suppurative tonsillitis, at the same time reducing temperature.—*Revue Générale de Clinique et de Thérapeutique*, August 22, 1889.

NAPHTHALIN AND TYPHOID.

According to the Berlin correspondent of the *Medical Press*, August 7, 1889, naphthol and naphthalin are now much employed as disinfectants of the intestinal canal, owing to a general belief in their germicidal power. Dr. Sehrwald has lately carried out a series of investigations with a view of determining precisely their efficiency in the laboratory of Professor Rossbach, of Jena, the results of which have lately appeared in an interesting form in the *Berlin. Kl. Wochenschrift*. His investigations were very extended and included a large nnmber of cultivation experiments, as well as experiments on animals. His results may be summarized as follows: Naphthalin acts only slightly on the micro-organisms of decomposition and of the fæces in typhoid, when the temperature is that of the room. Increased surface-action of the naphthalin, however, increases its power; when the temperature was raised to that of the body the action was much more intense, and it appears probable that the naphthalin first acts on the germs as a gas, damaging and destroying them. As a disinfectant in gaseous form it must act on fluids, more energetically in aërobes than on anaërobes. It must also attack such germs as are on firm soil more energetically than on those floating in liquids. The conditions in the intestinal canal favor the action of naphthalin, as the most favorable range of temperature is kept up, and the intestines by their peristaltic action favor the thorough intermixture of the germicide with the material to be disinfected. Naphthalin added to a fæcal mass reduces the germs to about one-half outside the body, but within to one-third or a quarter. The number, however, again increases in a short time, as some of the germs that have been more resistant than others recover their power of development. Added to typhoid stools naphthalin reduces the germ-contents to nearly one-tenth. Even the germs that remain after the administration of calomel are much damaged. As typhoid is to be considered a mixed infection, the administration of naphthalin should be begun from the first. The fact now ascertained, that part of its power is due to its action in the gaseous form, furnishes a new justification for its employment. As calomel acts as a germicide on some of the germs, it should be given; but as it spares others which in their turn are acted on by naphthalin this also should be given in order to make the treatment as rational as possible. Some of the naphthalin introduced into the body is absorbed and excreted through the kidneys. There is no reason to believe that this portion acts in any way as a germicide.

THE THERAPEUTIC LAW OF MM. DUJARDIN-BEAUMETZ AND BARDET.

The recent addition to our materia medica of a large number of synthetic chemical compounds has led to an attempt to formulate a law based upon the composition of those bodies, which can guide us in their selection for therapeutic purposes. With this object in view, MM. Dujardin-Beaumetz and Bardet have carefully studied a large number of the members of the aromatic series with the comparison of their action, with the object of formulating a law as to their therapeutic properties based upon their chemical constitution. According to these authors the aromatic compounds possess certain physiological properties which differ only in their degree of energy. They are at the same time antiseptic, antithermic, and analgesic, but, according to the chemical constitution, one or more of these properties always predominates and characterizes the therapeutic action of the body, and in some cases one property is so predominant as to render the others insensible. The law which these authors have formulated, and which was recently presented before the French Academy of Sciences, is as follows:

"Antiseptic effects especially characterize hydrated alcoholic derivatives, such as phenol, naphthol, etc.

"Antithermic properties are predominant in the amidogen derivatives, such as acetanilid, kairin, thallin, etc.

"Finally, analgesic properties are especially marked in the amidogen compound, where one atom of hydrogen has been substituted by a fatty radical, and particularly methyl (such as antipyrin or exalgin)."

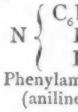
In criticising this law, Dr. M. J. Ville (*Gazette Hebdomadaire des Sciences Médicales*, July 27, 1889) claims that, from a chemical point of view, this law falls far short in the exactitude which should characterize the proposition that forms the basis of a scientific law. While, further, he claims that the au-

thors do not sufficiently take account of the principles of chemical nomenclature. Before considering in detail the objections which this author offers, it is necessary to define certain bodies which are concerned in the formulation of the law of Dujardin-Beaumetz and Bardet.

Amines.—This name is given to nitrogenous organic compounds which possess the characteristic properties of ammonia. Wurtz, who discovered this class, has shown that these bodies may be considered as ammonia, in which the hydrogen has been replaced entirely or in part by organic radicals, such as alcoholic radicals: for example,—

Ammonia.

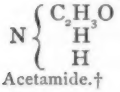
Methylamine.*



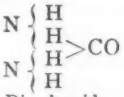
Phenylamine (aniline).

Amides.—These are nitrogenous organic compounds which closely agree with the amines in composition. They may be considered as derivatives of ammonia, in which the hydrogen is partially or totally displaced by acid radicals: for example,—

Ammonia.



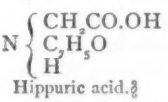
Acetamide.†



Dicarbamide (urea).‡

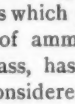
Alcalamides.—In constitution these bodies may be considered as derived from ammonia, in which the hydrogen is substituted partly by alcoholic radicals and partly by acid radicals: for example,—

Ammonia.



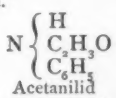
Hippuric acid.§

In this class of bodies are placed the anilides which are derivatives of aniline, in which an atom of hydrogen of the group NH_2 is replaced by the acid radical. As aniline is an amine, this substitution introduces an acid radical into its molecule, and it gives to the body a mixed amine-amide function; that is to say, an alcalamide: for example,—



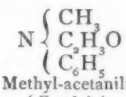
Ammonia.

Aniline (*Phenylamine*).



Acetanilid (*Antifebrin*).

The substitution of the hydrogen in the group NH_2 of aniline by organic radicals may be total, as is observed in the product recently introduced into medicine,—***exalgin***, or methylacetanilid:

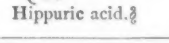


Methyl-acetanilid (*Exalgin*).

Again, before discussing the last two propositions of the law of Drs. Beaumetz and Bardet, it is indispensable to define the bases of the pyridin and quinolin series.

Bases of the Quinolin and Pyridin Series.—Synthetic chemistry has led to the attaching of pyridin and quinolin to benzine and naphtholin; that is to say, they are derived by the substitution of an atom of nitrogen for a group C.H. of the aromatic radical.

Thus, if benzine should be expressed from the point of view of its chemical constitution by a regular hexagonal scheme of which the six sides are each occupied by a group CH, in pyridin one of the sides of the regular hexagon would be occupied by an atom of nitrogen. Thus,



Benzine. Pyridin.

This hypothesis, which is due to Dewar and Korner, rests on the synthesis of Ramsay, who was able to obtain pyridin artificially by passing a mixture of acetylene and hydrocyanic acid through a tube heated red hot. There exists between quinolin and naphtholin the same relationship as between pyridin and benzine, and Korner, attributing to quinolin a constitution analogous to that of pyridin, regards it as naphthalin, in which a group

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* CH_3 is the methylic radical of methylic alcohol, CH_3OH.

† C_2H_3O is the acid radical of acetic acid, $C_2H_3O.OH$.

‡ In urea CO may be considered as the acid radical of the hypothetical acid, carbonic acid, and takes the place of two hydrogen atoms in two molecules of ammonia.

§ C_7H_5O is the acid radical of benzoic acid, C_7H_5OOH. $CH_2CO.OH$ is the complex alcoholic radical corresponding to glycocholic acid,

CH is replaced by an atom of N. If one should represent schematically the formula of the constitution of naphtholin by a bihexagonal surface, produced by the association of two benzolin hexagons united by one of their sides, a figure will be formed which will have eight sides, each occupied by the group CH. In quinolin one of these sides is occupied by an atom of nitrogen. It may be mentioned that these theoretical views have been confirmed by the remarkable synthesis of quinolin by Friedländer.

We have thus acquired sufficient facts to be able to discuss the propositions formulated by MM. Dujardin-Beaumetz and Bardet, so as to determine if their propositions, from a chemical point of view, possess all the precision which should characterize a scientific law.

"Antiseptic effects," these authors say, "especially characterize hydrated alcoholic derivatives (phenol, naphthol, etc.)." Professor Ville takes exception to this statement, in that these substances are derivatives of phenol and not hydrated alcoholic derivatives; for phenol and naphthol, as well as other phenols,* although they resemble in some respects the alcohols, and especially the tertiary alcohols, nevertheless form a distinct class.

According to Professor Ville, the other propositions are still more open to discussion. "The antithermic properties," according to Dujardin-Beaumetz and Bardet, "are especially dominant in the derived amidogens (acetanilid, kairin, thallin, etc.)." Professor Ville here claims that the term "derived amidogen" is too vague and lacking in precision, and it is clearly evident that the authors group under this name bodies which show essential differences in their chemical composition.

Thus, acetanilid is an amine-amide, or an alcamide; kairin and thallin are quinolin derivatives. Applying, now, the definitions given above, it is easy to see the differences which these bodies present in their chemical constitutions. In acetanilid,

$$(C_6H_5)—N\begin{cases} H \\ C_2H_3O, \end{cases}$$

the nitrogen forms part of the lateral chain fixed on the aromatic radical. This lateral chain,

$$N\begin{cases} H \\ C_2H_3O, \end{cases}$$

comes from the substitution of the acid radical C_2H_3O for an atom of hydrogen of the amidogen group NH_2, which in anilin is the lateral chain, and is likewise fixed on the aromatic radical C_6H_5. In kairin and thallin, on the contrary, the nitrogen forms part of the aromatic root. These are, then, products at the same time of substitution and addition to quinolin, and should thus preserve the name of quinolin derivatives, and should not be confounded with the amines and the aromatic amides. The same objections may also be offered to the third proposition: "Analgesic properties attain a maximum in the amidogens where a fatty radical, and especially methyl, has been substituted for an atom of hydrogen (antipyrin, acetphenetidin, exalgin, etc.)." Antipyrin is a quinolin derivative, and should not be confounded with acetphenetidin and exalgin, which come from the substitution of organic radicals for the hydrogen in the lateral amidogen chain NH_2 fixed on the aromatic root. As regards exalgin, Professor Ville alludes to the confusion which has been introduced into the work of Dujardin-Beaumetz and Bardet, and which we have already referred to. These authors have confounded this body with aceto-orthotoluidin, for they designate this body as orthomethyl-acetanilid. We have already called attention to the fact that the correct name for exalgin is methyl-acetanilid. It would seem from the above that the propositions of Dujardin-Beaumetz and Bardet, not being based on strict chemical facts, possess little value as forming the basis for a scientific therapeutic law.

* Phenols are derived aromatic hydroxyls resulting from the substitution of hydroxyl, OH, for one or more atoms of hydrogen of the aromatic hydrocarbons.

THE LOCAL USE OF ICE OR COLD IN THE TREATMENT OF BURNS.

In the *American Practitioner and News* for August 17, 1889, Dr. J. G. Carpenter recommends in the treatment of burns the local use of ice or ice-water on account of the anodyne, anæsthetic, antiphlogistic, and astringent effects of the application.

He reports two cases of burns in which $\frac{2}{3}$ grain of morphine and $\frac{1}{60}$ grain of atropine were given in one hour in divided doses to relieve pain and shock, and then soft linen cloths one-third larger than the area of the

burn were wrung out of the ice-water and applied to the burn. These cloths were changed every ten or fifteen minutes for twelve hours, then every hour or two for twenty-four hours, and then every two or three hours for twelve hours, and then dispensed with.

The writer claims that by the continuous use of cold in this manner, the pain, heat, redness, tumefaction, phlyctenula, and exfoliation of the cuticle were subdued and inflammation controlled; that in forty-eight hours the patient was virtually well of his burns.

In both the author's cases the patients suffered from no pain or discomfort as long as the applications were changed at proper intervals and used systematically. The question as to how cold acts is answered by the writer as follows:

The physiological action of ice or cold, first, is to cause vascular contraction through the vaso-motor nerves and diminish the amount of blood in the arterioles and capillaries; second, following this constriction of the vessels is a relaxation of the vaso-motor dilators and hyperæmia. When cold has been unduly applied, the vitality of the parts is impaired and the physiological congestion becomes pathological, and an inflammatory process is established. But in the treatment of burns the cold is judiciously applied just sufficiently to give ease and comfort to the patient. When there is pain, increase the cold or ice applications,—that is, make the cold more intense or change the applications oftener, at shorter intervals. As the inflammation subsides use less and less cold; though it must not be forgotten that cold, unduly applied, is an irritant, a pain-maker, and that ice applied directly to even pathological conditions is painful; but when the parts are protected by sufficient layers of cloths, in acute and subacute congestions and inflammations, it is an anodyne, anæsthetic, astringent, antiphlogistic, and local tonic.

Cold, locally, is similar to the action of cocaine, in that it contracts the arterioles and capillaries, drives the blood from the parts affected, blunts or obtunds sensibility, and is both anæsthetic and anodyne; and these effects can be continued indefinitely as long as the acute or subacute congestion or inflammation continues, and on subsidence of the latter the cold must be stopped. By this contraction of the blood-vessels by ice, in the treatment of burns, hyperæmia, and the other stages of inflammation are arrested or prevented, and ice is antiphlogistic. Through the anodyne, anæsthetic, and antiphlogistic effects of ice, local and general irritation is arrested and prevented, and excess of blood is drawn from the burn by the contraction of the blood-vessels. Ice is astringent, not only to the latter, but to all the tissues involved in the burn, and by holding the vessels in this contracted state becomes a local tonic.

Ice is not only indicated in the first and second stages of burns, but in all the stages contained in that most excellent classification of Dupuytren.

Authorities state the vesicles should be punctured in scalds or burns. This is, doubtless, bad practice, for the serum is lost and the blisters themselves become so many sores or wounds to be treated, as well as the other lesions of the burns. On the contrary, if ice or cold is used judiciously from the incipiency, or the first one or two hours after the burn, the serum is absorbed and a cohesion takes place by adhesive inflammation between the vesicle wall, cuticle, and *rete mucosum*, and the skin returns to its natural state. In burns, where there is exfoliation of the cuticle, the oases of erosion through the effects of cold do not suppurate. Ice can be used in conjunction with other measures that are aseptic and antiseptic in the other stages of burns, and the one supplements the other. In conclusion, it may be said that in the use of cold the lesions of burns are kept in an aseptic condition.

ANTIFEBRIN IN FEBRILE DISEASES.

Following the suggestion of Professor T. M. Bogomoloff, Dr. Vasily M. Edemsky, of St. Petersburg, has carried out (*Meditzinskoiĕ Obozreniĕ*, No. 4, 1889, p. 415; and *St. Petersburg Inaugural Dissertation*, 1888, p. 129) a course of elaborate clinical experiments for the purpose of studying the therapeutic effects of antifebrin in various febrile affections. His materials consisted of twenty-five cases which came under his observation in the Krasnoselsky Udelnyi Hospital, and of which eight were referred to typhoid fever, six to pleuropneumonia and croupous pneumonia, three to acute or subacute rheumatic polyarthritis, two to chronic pneumonia, two to pleurisy, one to puerperal fever, one to intermittent, one to facial erysipelas, and one to gangrene of toes (*post-pernionesis*). The main outcome of the author's researches, as analyzed by Dr. V.

IDELSON in the *London Medical Recorder*, July 20, 1889, may be given in brief outline, as follows:

A. *The Influence of Antifebrin on the Temperature.*—1. Speaking generally, the rate of the antipyretic action is directly in proportion to the size of the dose used. 2. Given equal doses, the strongest effects are obtained in typhoid fever; then follow, in a descending scale, croupous pneumonia, pleurisy, chronic pneumonia, rheumatism, and, finally, puerperal fever. 3. The drug should be given in from 10- to 20-grain doses two or three times a day, or 5 grains every hour. The latter mode of administration is by far the better, since the fall of the temperature proceeds then more slowly and evenly, without being accompanied by profuse sweats, cyanosis, or collapse. Hence it is possible to administer quite safely and conveniently even as much as eighty grains of the drug a day. 4. For the first twenty or thirty minutes after a dose the temperature remains unaltered, but subsequently begins to sink about .1° C. every five or ten minutes. 5. A combined administration of antifebrin with antipyrin, from 3 to 5 grains of each, gives slighter antipyretic effects (including a later occurrence of a maximal fall) than that of antifebrin alone. [Professor T. J. Bogomoloff, of Gatchīna, strongly recommends a combined administration of antifebrin in fractional doses (up to two or three drachms in twenty-four hours) every hour, with 5 grains of antipyrin, in puerperal and surgical fever, pulmonary phthisis, and acute rheumatism.—*Rep.*] 6. Antipyrin and thallin, in equal doses, and salicylate of soda, in double doses, are very inferior to antifebrin in respect to their antipyretic effects.

B. *The Influence on the Pulse and Respiration.*—1. The fall of the temperature is accompanied by a decrease in frequency of the pulse and respirations. 2. The decrease, however, is by no means always proportionate to the size of the dose. [Thus, in puerperal and typhoid fevers, smaller doses sometimes improve the pulse and respiration far more considerably than larger ones.] 3. Further, given equal doses of the drug, their effects vary according to the disease. [Thus, given 5-grain doses, the affections may be arranged in the following descending series in regard to the antipyretic effects: typhoid, croupous pneumonia, pleurisy, puerperal fever, chronic pneumonia. In the case of 10-grain doses: erysipelas, croupous pneumonia, chronic pneumonia, pleurisy, rheumatism, typhoid; 15-grain doses: croupous pneumonia, typhoid; 20-grain ones: pleurisy, croupous pneumonia, erysipelas, typhoid.] 4. A combined administration of antifebrin with antipyrin shows a less marked influence on the pulse and respiration than antifebrin alone. 5. Given all other equal conditions, antipyrin, thallin, and salicylate of soda likewise prove to be inferior to antifebrin. 6. The tension of the pulse (as measured by Basch's apparatus) is increased under the influence of antifebrin when the drug is given in moderate and even in more or less large doses.

C. *Nitrogenous Assimilation and Metabolism.*—1. Of four cases examined, in three the assimilation increased, in one decreased. 2 Of three cases examined, in two the metamorphosis increased, in one decreased. 3. The amount of extractive substances in the urine lessens, while that of the urea nitrogen rises in a corresponding degree.

D. *General Conclusions.*—1. Antifebrin may be especially recommended in typhoid fever as a good substitute for hydrotherapeutic methods, which are rather troublesome, and by no means invariably successful. While depressing the temperature, the drug subdues delirium and improves sleep and appetite. 2. The remedy is further indicated in pluerisy and acute rheumatism, where it promotes the absorption of effusions. [The same may be said, according to Dr. Bogomoloff, in regard to croupous pneumonia, *loc. cit.*—*Rep.*] 3. Antifebrin is one of the best remedies for erysipelas of the face or head, where it rapidly relieves headache. 4. In febrile affections generally, antifebrin should be preferred to antipyrin, quinine, thallin, or kairin, since "it depresses the temperature through its influence on the nervous system by increasing loss of the systemic heat, without causing any injury to the nerve-centres, heart, or kidney." 5. When employed in frequent small doses the drug gives rise to collapse but exceedingly rarely, and when it does the symptoms are dependent upon either some impurity of the preparation employed, or idiosyncrasy of the patient. In the *Meditz. Obozrenīē*, No. 5, 1887, p. 521, Dr. T. J. Rūdenko, of Moscow, writes that he has tried antifebrin, in doses of from 2 to 4 grains, repeated in an hour or so (that is, from 4 to 8 grains a day), in eleven febrile cases (five of typhoid, one croupous pneumonia, two pleuropneumonia, one pleurisy, and two chronic pneumonia), and came to the following conclusions: 1. The drug is cheap, tasteless, and really antipyretic, free from any acces-

sory effects, except slight rigors and perspiration. 2. It does not show, however, any influence on the course of any of the diseases named. 3. Sometimes (in three pneumonic cases) it gives rise to a "black beer" discoloration of the urine, resembling that from kairin. 4. The fall of the temperature varies between .5° and 2.5° C., being mostly 1.2° or 1.8° C. 5. The amount of the decrease varies according to the patient's individual peculiarities and the height of fever, but, speaking generally, is larger when the drug is used in repeated small doses. 6. The decrease lasts from two to four hours, the temperature returning to its previous level in five or six hours. 7. The pulse slackens from eight to eighteen beats per minute. 8. In healthy persons (three cases), the same doses of the drug cause, in an hour, a rise of the temperature, amounting to .1° or .2° C., lasting two hours, and accompanied by a slight acceleration of the pulse.

In the *Meditz. Obozreniĕ*, No. 1, 1888, p. 72, Dr. Ivan A. Albitzky, of Valkĭ, describes the case of his wife, suffering from advanced pulmonary phthisis, and treated after Kremĭansky's method by the inhalation of aniline and the internal use of antifebrin. The latter was given in 10-grain doses, two or three times daily, day by day, for a twelvemonth. In all, the lady ingested about four pounds of the drug. No unpleasant effects from such prolonged use were ever noticed, the temperature being successfully kept by the means at 37.5° or 37.8° C. On the whole, the patient greatly improved, though she became blue (from aniline). At the Second General Meeting of Russian Medical Men at Moscow, Dr. Alexĕi I. Shtcherbakoff, house-physician to Professor M. P. Tcherĭnoff's clinic, made (*Transactions of the Meeting*, vol. i., 1887, p. 8) a communication on the treatment of pulmonary phthisis by inhalations of benzine fumes and antifebrin internally, in from 2- to 4-grain doses, in wafers. On the ground of eleven cases, the author states that antifebrin represents a very valuable antipyretic means in the therapeutics of consumption, though it does not exercise any appreciably direct influence on the disease itself. In a majority of cases, daily doses varying from 2 to 12 grains are said to secure a permanent apyrexia during the whole day and night, the decrease of the temperature not being accompanied by sweats, cyanosis, or rigors. In a certain proportion of cases, however, even larger doses (28 grains a day) fail to establish a stable defervescence. In such patients the drug may occasionally give rise to collapse, with a rapid fall of the temperature down to 34° C., and that even when the remedy is used in such small quantities as 4 grains. Now and then "antifebrin cannot be tolerated in consequence of its causing a kind of intoxication or a state resembling that arising from inhalation of coal-gas." As to the benzine inhalations (every hour for five minutes, 4 drachms daily), they are considered to invariably alleviate expectoration and cough, and never to be accompanied by any untoward effects beyond some headache or fulness about the head. In some patients they even seem to diminish the number of tubercle-bacilli in the sputa and to check altogether the progress of the pulmonary process.

At the same meeting, during a lively discussion following Dr. Ansĕroff's communication, Dr. Jakov I. Trŭsevitch, of St. Petersburg, said (*Meditz. Obozreniĕ*, Nos. 2 and 3, 1887, p. 178) that he had seen grave collapse following an 8-grain dose of antifebrin in a typhoid girl of 12. Similarly, Dr. S. S. Goloŭsheff, of Moscow, had observed collapse from a 5-grain dose in a woman. Curiously enough, a subsequent gradual increase of the dose (up to 8 grains) in the same patient was tolerated quite well. He came to the conclusion that the organism may get habituated to the remedy. Dr. A. G. Kramnik, of Smolensk, reported (*Vratch*, No. 4, 1887, p. 83) an instance of collapse from antifebrin in a patient with typhoid fever of an intermittent type. He believes that, in some cases at least, collapse may be caused by the antipyretic action of the drug coinciding with a spontaneous fall of the temperature (the result being a decrease far below the standard). Dr. V. I. Antŭshevitch, a lady physician of Orlov, drew attention to the necessity of the utmost caution in the use of powerful antipyretic drugs in general, since they may give rise to some other very unpleasant complications in addition to collapse. Thus, in a strong woman suffering from typhoid fever, "one gramme of antipyrin had been followed by a striking dilatation of the peripheral blood-vessels, with stasis and consecutive gangrene of a foot." Such cases were thought to be "caused by a depressing action of antipyretics on the heart." In his remarkable work "On Infection and Phthisis" (Kharkov, 1887), Professor Jakov S. Kremĭansky warmly eulogizes the internal use of antifebrin in consumption, not only as an antipyretic, but also as a bactericide. The author frequently observed a distinct diminution of tubercle-

bacilli in the sputa, effected by the drug. As a rule, he gives from 3 to 5 grains, three or four times daily, but in such cases, where the doses fail to secure a permanent defervescence, he increases the amount sometimes to sixty, or even seventy, grains a day. He never yet met with a single instance of collapse or any other untoward effects from the drug.

Reviews.

NATURE'S HYGIENE. A SYSTEMATIC MANUAL OF NATURAL HYGIENE, CONTAINING A DETAILED ACCOUNT OF THE CHEMISTRY AND HYGIENE OF EUCALYPTUS, PINE, AND CAMPHOR FORESTS AND INDUSTRIES CONNECTED THEREWITH. By C. T. Kingzett, F.I.C., F.C.S, etc. Third edition.

London: Baillière, Tindall & Cox, Kingwilliam Street, Strand, 1888.

"Nature's Hygiene" reminds us of "Nature's Own Cures," which we read about in the newspapers, and they are only other names for man's fraud and failure. It is to be hoped that "Nature's Hygiene" is not in like manner somewhat tainted. And yet throughout the book this idea clings like an odor of decay to facts apparently the freshest and observations the newest. It is very readable, and to the scientific student, after turning over his desiccated manual, it may seem a veritable specimen of light literature, quite a fiction of science, but it is, like many novels of to-day, written with a deep purpose,—viz., to vaunt the virtues of "sanitas" in every conceivable way. It is very thorough and systematic, beginning with the alphabet of science,—the "constitution of matter." It abounds in statistics and tabulated statements. It covers all sanitary subjects,—ventilation, sewerage, water-supply, etc., but for "sanitas" it has ever its word to say, and "sanitas" throws a suspicious gloom over the author's facts, and makes us for a moment doubt his soundest conclusions. Is sewer-gas proved to need a purifier, "sanitas" does it first, last, and best. Are rooms stuffy from foul air, "sanitas" can rectify that. Is water poisoned at its source, so much "sanitas" to the gallon, and lo! it is pure. No "certain herb" made the waters of Marah sweet for the thirsty Israelites with half the speed and certainty with which "sanitas" would have done it. When the author enters upon a comparative study of antiseptics and germicides, lo! "sanitas," like the name of Abou Ben Adem, "leads all the rest." When he goes farther, and investigates disease, tries to educe from scientific reasoning some way of successfully struggling with bacilli, bacteria, and ptomaïnes, what but "sanitas" leaps boldly to the attack where older combatants hesitate and give way? When tubercle is proved to depend upon a bacillus, "we must resort for a cure to a disinfectant which will arrest the development of the micro-organism without harming the host." "Such an agent is 'sanitas' oil;" and so on through the list of diseases which afflict humanity.

The latter half of the book is devoted entirely to "sanitas" and its alleged ingredients. The study of the eucalyptus is here found prescribed in the most thorough and favorable way. Then pine, whose oil also enters, we are told, into "sanitas," has its virtues extolled till we almost doubt them, and peroxide of hydrogen, turpentine, and camphor close the volume. Taken as a whole, elaborate, scientific work, written by a man of acknowledged scientific attainments, and yet in reality only as a gigantic puff of a proprietary remedy, the book is a monumental anomaly in the field of scientific advancement.

E. W. W.

THE PHYSICIAN HIMSELF, AND THINGS THAT CONCERN HIS REPUTATION AND SUCCESS. By D. W. Cattell, M.D., Baltimore, Md. Ninth edition, revised and enlarged.

Philadelphia and London: F. A. Davis, 1889.

Since noticing this work it has gone through five more editions, making nine in all, and has been revised and enlarged. It has grown in grace as well as in size, both in grace of form, its binding and general appearance being much more refined, and in what might be considered as "inward and spiritual grace," to borrow from the theologians, and at almost every turn of the page there can be descried an elevation of moral tone which was needed. It is not always so worldly-wise. It allows a man now, even if desirous of professional success, to do some few things nobly, to take some active part in life, have some sentiment of his own unsmothered by his craze for pelf. The poor, idealess, washed-out creature, who was bound to succeed in edition the fourth, now stands a little more erect, has a few opinions which he dare express, especially if they are on the side of the majority,—the rich and influential majority of his own community. He has made something, put away something in bond and mortgage, in real estate and sound stocks, by following his guide through the earlier edi-

tions, and now he ventures a little independence; but, alas! a hundred editions will be needed at his present rate of progress to make him a decent man, with backbone and moral virility. "The Physician Himself" contains, we acknowledge, a vast amount of worldly wisdom, and one may follow its guidance with advantage in many cross-roads of life without loss of self-respect; but there must be a line drawn somewhere, and one can hardly obliterate all the salient points of his character for a little more money, a few more dollars and cents, without deterioration. And when, if ever, the release comes, when by long following of his "vade-mecum" he is independent at last, will it not be hard even to shake off the life-long monitor? Will he not be so trained in cringing that he cannot stand upright? And, as for the actual value of the book to its possessors, now that so many have bought it, read it, and approved it, has not every one noticed how of late the old-time friction between one physician and another has diminished? Can we not parody, and say, "See how these physicians love one another?" And are we not all as a body, and individually, growing richer, living better, just from the influence of one small book,—"The Physician Himself?" If in every department such books could only be written; if we could have for the shoemaker "The Shoemaker Himself," and for the burglar "The Burglar Himself," and even "The Murderer Himself," as well as similar books for scavengers and railroad presidents and loafers and cranks and politicians, how speedily, if the books acted in other employments as the one before us has done, would the millennium come,—that fast-fading vision of time, when the lion and the lamb, homœopath and allopath, laborer and capitalist, shall lie down together! but, alas! they will lie down not so very far apart from their long rest, and none shall hurt or destroy, for the arms of all shall be nerveless, and death will triumph over the physician himself, with his animosities and struggles. Whether he will look back in his last hours with great satisfaction upon a busy and useful life, spent in following our author's precepts, or, perhaps, with greater if he has carved out his own character and developed himself rather upon the lines nature gave him and with the guidance religion and morality afford, will depend somewhat upon whether he buys and reads and follows "The Physician Himself."

E. W. W.

Correspondence.

PARIS.

(From our Special Correspondent.)

Aniseed Oil the Injurious Agent in Absinthe—Bismuth as a Substitute for Mercury—Exposition Nosology—Guaco in Eczema—Theine Sold for Caffeine—Turkish Way of giving Backshish.

A recent letter related interesting physiological experiments made by Drs. Cadéac and Albin Meunier, of Lyons, with anise- and fennel-seed-oils.* The investigations, it now appears, were only a part of a rough research undertaken on the injurious constituent of baneful "absinthe." The notorious bitter, as most people probably know, was first introduced in Algeria as an appetizer and fever preventive, and it there proved beneficial, wormwood—in French, *absinthe*—being really a good febrifuge and tonic. Only various aromatics were successively added to improve the flavor, and it soon became a regular tipple. Some elixirs, too well known in American drug-stores to need mentioning by name, have had similar fortunes, nearly all the medicine being on the label for show. Sensational statements have been circulating about the consumption of absinthe. The truth is, many here never touch it, some because they dislike the flavor, and others because their claret and water is all that they care for, while the majority use absinthe in moderation,—that is, one glass as an appetizer before meals. Yet, it must be confessed, there are slaves to absinthe as there are to opium or coca, and the baneful effects of the abuse on some classes cannot be denied. They are, indeed, well known, and have often been described in medical treatises. Only wormwood, giving the name to the compound liquor, has naturally been considered responsible for the accidents, and "absinthism" is the term applied to the general symptoms. Of late, however, the doctrine has been called in question. First, the quality of the alcohol was in cheaper absinthes shown to be very bad, the highly aromatic taste enabling the maker to use unpurified spirit contaminated with the poisonous fusel oil, furfurol, and higher alcohols generally. Now Drs. Cadéac and Meunier have again taken up the investigation in a more systematic manner, and examined separately each one of the ingredients. The usual formula for absinthe, it seems, is as follows:

* The Therapeutic Gazette for August, 1889, page 568.

Essential oil of anise, 6 grammes;
Essential oil of star anise, 4 grammes;
Essential oil of wormwood, 2 grammes;
Essential oil of coriander, 2 grammes;
Essential oil of fennel, 2 grammes;
Essential oil of peppermint, 1 gramme;
Essential oil of hyssop, 1 gramme;
Essential oil of angelica, 1 gramme;
Essential oil of lemon balm, 1 gramme;
Alcohol of 70°, 1 litre.

Dissolve, and color green with either fresh parsley or nettle-leaves.

Hence, when our Gallic friend proceeds to what he calls *étouffer un perroquet* (to choke a parrot), he absorbs, not to speak of the alcohol good or bad, various oils, of which wormwood forms only ten per cent. According to the memoir last week presented to the Paris Academy of Medicine by the Lyonese doctors, the following are the effects on a healthy man of the different oils composing absinthe: 1. Oil of hyssop, in $\frac{1}{8}$-grain dose, on an empty stomach, will cause general stimulation, followed successively by visual aberrations, torpor, tremors, vertigo, and somnolency; it is a powerful epileptizer. Yet, as its proportion in the liquor is small, its share in the injurious action of absinthe is inconsiderable. 2. Coriander: 16 grains on an empty stomach will make one feel comfortable, and for twelve hours procure pleasant general stimulation, accompanied by no tremors or somnolency. Toxic doses will determine sudden anæsthesia, but never any convulsive symptoms. Considering the small proportion in the liquor, it only acts there as an exhilarant and stimulant. 3. Fennel: 16 grains, to a man fasting, will cause visual troubles and head heaviness, soon followed by pleasurable stimulation and imperious need of motion, accompanied with the enjoyment of moving for its own sake. After an hour, tremors follow, together with prostration and somnolence. In the proportion of two grammes per litre oil of fennel imparts to absinthe only stimulating properties, but when partly substituted to anise it will render it convulsivant. 4. Wormwood: 2 grammes (30 grains) of the oil, when taken on an empty stomach, for several mornings in succession, will induce in man a feeling of comfort, self-confidence, and muscular power, with clear perceptions and pleasant thoughts. No vertigo, tinglings or tremors are observed, and only increased appetite and improved digestion. Afterwards no depression or somnolence will be noticed. Hence the opinion that wormwood (absinthe) is the cause of absinthism is wrong, since for several days a man may without harm absorb as much of it as is contained in a whole litre of absinthe. 5. Lemon balm: 30 grains will cause, after a short stimulation, weariness and sleepiness. To a slight extent it plays a part in the heaviness, prostration, and somnolence of absinthe-drinkers. 6. Peppermint: 30 grains on an empty stomach will occasion general warmth, followed by perspiration. In large doses it acts much like ordinary alcohol; otherwise it operates chiefly on the stomach and intestines, which for two hours it causes to contract powerfully. 7. Angelica: in 30-grain doses, internal warmth and stimulation, followed by general depression. 8. Anise and star anise: both have identical properties; 15 grains of the oil on an empty stomach will procure at first a feeling of general warmth and want of motion, followed in ten minutes by sudden depression. The sight will become confused, the gait faltering and inco-ordinate, motion slothful, and will impaired. Soon tremors and stupor will ensue, while the feeling of comfort persists, and sleep will supervene for about two hours. The dull inebriety will last to the following day, but neither the appetite nor the digestion be impaired. Although anise oil cannot be said to be a poison, it is very injurious to the nervous centres, as but little more than 15 grains will occasion epileptiform attacks, and to it chiefly and fennel should the injurious effects of absinthe be attributed. The bitter being taken diluted with about eight times as much water, Drs. Cadéac and Meunier think the influence of alcohol may be neglected. Should their conclusion be adopted, the mischief occasioned by the green-eyed fairy (*la fée aux yeux verts*)—and according to the tale there were wicked as well as good fairies—should be called absinthism no longer, but anisism.

Experiments with bismuth hypodermically have been begun, as you were advised beforehand, but so far the results cannot be considered altogether satisfactory. Preliminary trials on animals were made at the Sorbonne laboratory by Dr. F. Balzer, of the Lourcine Hospital. The solution used was the ammonio-citrate, prepared by pharmacist Portes of the same hospital, in accordance with the American national formulary of unofficinal preparations, and diluted so as to contain two centigrammes ($\frac{1}{3}$ gr.) of metallic bismuth to the cubic centimetre (16 gtt.) The effects were gingival ulcerations and other buccal lesions; abundant salivation, and stomatitis more sudden and severe than when caused

by mercury. With small doses, long repeated, the gums presented a brownish-purple line at the edge, teeth became loosened, and breath fetid. In one case a ten-pound dog died two days after one hypodermic injection representing fourteen centigrammes (2 grs.) of metallic bismuth. In another, a twenty-two-pound dog, after being administered sixteen centigrammes (2⅓ grs.) inside of ten days, and ten centigrammes (1½ grs.) more afterwards, all in small daily doses, died on the eighteenth day. Next, a fifteen-pound dog survived after a number of daily injections of one centigramme (⅙ gr.), while another died under doubtful circumstances. Chemical analysis showed large quantities of bismuth in the urine and saliva during life, and, after death, in most tissues, but chiefly in the liver and kidneys. The idea was to try bismuth as a substitute for mercury in syphilitic diseases, but the experiments, though as yet incomplete, hardly encourage a change of the sort. It will probably be news to most American practitioners to hear that even a dog can be poisoned with citrate of bismuth.

A curious article on Exposition patients might be written by the physicians attached to the medical bureau. But so far, only statistics have been published, with now and then suggestive remarks, serving only to whet curiosity. A medical service was, of course, organized from the beginning, thousands of workmen being employed on the lofty structures, and exposed to the ordinary risks of building trades. When the Exposition opened to the public, provisions were made for the expected attendance, and medical stations established in four different places, connected by telephone. Although one hundred thousand visitors a day only were counted upon, and the number was often doubled, and occasionally trebled, the service has been equal to all demands. On an average, so far, five or six hundred patients have been attended every month. Strange enough to say, leaving aside casualties not chargeable to the Exposition, the great majority were cases of syncope, caused by fatigue, heat, and want of food. Not that the patients were penniless; but, after long and uncomfortable railroad journeys, sleepless and tired, they had rushed to the Exposition, and there wandered from section to section, in their admiration for the wonders forgetting all their bodily wants, till they fell fainting from sheer exhaustion. The opposite excess brought others to grief. Coming in with a large family and a well-supplied basket, they had spread themselves under a shading tree,—there is nothing a Frenchman loves like eating in open air,—and partaken too heartily of the good things provided by the thoughtful housewife. After a long tramp the tired stomach will sometimes crave more food than it can well manage. Drunkenness proper has been rare. Paris air seems not to favor hard drinking. But cases of what may be termed nervous inebriety have not been unfrequent, especially among women. On a hot day, fatigued and desperately thirsty, they would swallow at one draught a large tumbler of iced lemonade, with something in it added by a well-meaning male escort to keep the chill out, and suddenly they would see everything, the Eiffel tower included, turn around them, and have to be taken to the medical station. There the attendant smiles, and with a few drops of ether soon sets them on their feet again. Sunstrokes, notwithstanding the unprecedented warm summer, have been very rare, owing probably to the trees and the liberal provision of awnings covering all the important walks in the open grounds. But perhaps the most characteristic affection is the nervous shock occasioned by the tower gun. Every night, at a quarter to ten, after the luminous fountains have been playing for some time, and entranced the beholders by their gorgeous display of changing colors, a gun is fired from the Eiffel tower, as a signal that it is going to be set ablaze for the final tableau. At the unexpected report, quite a number of young girls will go into hysterics, and have to be carried away fainting, or half-crazy, to the medical station, where they are soon revived. Dr. Charcot, it is said, is taking notes on these cases, as pertaining to his specialty of nervous affections and hypnotism.

After every important event, like the recent Therapeutic Congress, some interesting items usually remain to be gleaned when the harvest has been gathered in. Among such, a paper on guaco may be mentioned, which was presented by Dr. L. Butte, of the Saint-Louis Hospital, and only read by title. The preparation experimented with was a watery extract from the root of *Aristolochia cymbifera*, the true guaco, according to Guibourt. From researches on animals, Dr. Butte has concluded that the extract chiefly acts on the digestive and also the nervous system. It is an emeto-cathartic, too powerful and dangerous, however, to be at present recommended in human therapeutics. On the other hand, the analgesic properties of guaco suggested

its trial in local applications for the pruritus of some skin-affections, and as such it proved very beneficial in cases of dry eczema with intolerable itching, with burning sensation, making sleep impossible. The drug, in the shape of a decoction,—about five drachms of the coarse powder to a quart,—was applied in lukewarm fomentations and compresses, and every time greatly relieved the patients, allowing them to enjoy refreshing sleep, a comfort no other treatment had before afforded. At the same time the eczematous lesions appeared to gradually change for the better. Yet it is important to bear in mind that in cases of discharging or eruptive eczema, the lotions should be withheld, as guaco is apt to cause irritation.

Another instructive piece of information brought out during the discussion respecting the properties of caffeine, is that most of the active principle now found in the market is not extracted from coffee, but theine obtained from refuse teas injured during the sea-voyage. Although the two substances have hitherto been by most chemists considered identical, there are now good reasons to think they are not, but only isomerous, which is quite another affair. Certain it is that tea will cause palpitations of the heart, while coffee will not, and that the same symptom, unknown when true caffeine was used, has greatly puzzled recent experimenters with the product now supplied under the same name. And, lastly, an amusing incident occurred at Rheims, where the Common Council gave a reception with a lunch to a visiting delegation of congressmen. Colonel Bonkowski-Bey, the Turkish representative at the Congress of Therapeutics, was, owing to his fez, mistaken for the Shah of Persia, then also a guest of France. The Rhemish gamins began shouting "Vive le Chah!" The good Bey, to get rid of them, said, pointing to Dr. Bertillon, the anthropometric scientist, they should apply to the next man, his purse-bearer. Dr. Bertillon took the joke, and with a few pennies satisfied the urchins, admitting he was caught fairly.

PARIS, September 20, 1889.

LONDON.

(From our Special Correspondent.)

Ever since the introduction of antipyrin into practical medicine communications have been continually made to the medical journals of various countries on its physiological and therapeutical action. In spite, however, of the great amount of research done, the action of the drug is not yet fully explained. This, perhaps, is partly due to the fact that antipyrin acts on those functions of the body about which there is still diverse opinion among physiologists. These functions are those connected with the regulation of heat-production and heat-loss in the body, and those of sensation. One of the latest contributions to the subject is by Dr. Batten and Mr. Bokersham, who have conducted their experiments under the direction of Dr. Lauder Brunton at St. Bartholomew's Hospital. The object of the research was to elucidate, if possible, the action of antipyrin in cases of migraine, and in those forms of headache to which the specific name of migraine cannot be applied. In some of these cases, as the authors explain, the temporal arteries have been observed to be in a condition of spasm, which may be considered as in causative relation to the pain. In testing, however, the effect of antipyrin on the walls of the blood-vessels, it was found that the drug had no effect in causing them to expand or to contract, a fact which may be taken as in accordance with the generally received opinion that antipyrin has no effect on the normal blood-pressure. It must, however, be allowed that the drug may have an effect on a pathologically contracted arteriole, acting on the nerves supplying the vessel wall, or on the centres in connection with them. In another respect the experiments of these observers are interesting. It was found that in cats and guinea-pigs antipyrin produced spastic rigidity of the hind limbs, lasting a few hours. This rigidity resembles in many points the similar condition observed in lateral sclerosis in men. Thus it was induced and aggravated with any attempt to use the limbs, and there was a great excess of myolatic irritability, and in one experiment "phenomena similar to that of ankle-clonus were obtained." Antipyrin in these animals, therefore, appears to act on the lateral columns of the spinal cord. Whatever may be the results obtained by subsequent observers on this point, there is no doubt that the exact localization of the action of drugs on a particular portion or tract of the central nervous system is a subject of extreme importance. It is, indeed, only by this exact knowledge that we can hope to affect by means of medicaments the pathological changes that occur in the central nervous system,—changes which are now combated with but little success by the despairing physician.

This year the Croonian Lecture before the Royal Society was delivered by M. Roux, in the place of M. Pasteur, who had been invited to deliver it, but was unable to be present. M. Roux, who is well known as a disciple of Pasteur, spoke on "Preventive Inoculation." In a very interesting lecture, he dealt with the history of the subject, bringing out the salient facts established by Pasteur's brilliant investigations. The lecture comes very *apropos* of the proposal to subscribe towards the Pasteur Institute of Paris, on account of the number of English patients treated there. This proposal has been, as was expected, strenuously opposed by a certain section of the community; but, at a very successful meeting, held under the presidency of the lord mayor at the Mansion House, a large sum of money was subscribed to the institute. No doubt in time the authorities in England will see their way to enforcing measures which will materially aid in stamping out hydrophobia.

In a communication made last year before the Therapeutical Section, at the meeting of the British Medical Association in Glasgow, Professor Thomas Fraser gave the results of his investigations into the relative usefulness of iodine and morphine in the treatment of diabetes mellitus. Great stimulus was no doubt given to the employment of codeine in this disease by the beneficial effects ascribed by Pavy to it on its first introduction. It was said to act better than morphine or opium. As Fraser remarks, it would be difficult *à priori* to assign any reason for this superiority of action of codeine over morphine, and, as he points out, in all its other effects, it acts only as a "weak morphine," a somewhat happy phrase, which exactly expresses the effect of the drug. This is well seen in the relief of cough, in the production of sleep, or the removal of pain in the abdomen or elsewhere." Is this the same in diabetes? For several years Fraser has been investigating the question, and the results are clear from his carefully rendered cases. Morphine was found in all cases to have a more powerful effect than codeine; it caused a greater diminution both of the water and of the sugar contained in the urine. Dr. Mitchell Bruce had previously arrived at the same conclusion, and quite independently, so that it must be taken as proved that codeine is not so advantageous in the treatment of diabetes as morphine. One fact which Bruce states seems of great importance,—viz., that morphine has a more powerful effect when given by the mouth than when given by hypodermic injection. Further investigation of this point is necessary, but it may be shown in the future that morphine when taken directly to the liver, as it would be by the portal blood when given by the mouth, may influence the transformation of glycogen into sugar.

Dr. Lauder Brunton has lately been delivering the Croonian Lectures before the Royal College of Physicians. As was to be expected, Dr. Brunton chose as his subject scientific therapeutics, the title of his lectures being the "Relationship between Chemical Structure and Physiological Action." The ground covered was naturally very extensive, but the subject was treated chiefly in relation to the varying action of the organic (carbon) compounds. Many of the facts stated by the lecturer were already well known, but many also were new: and the chief importance of the lectures lies in the consideration that it is a serious attempt to group together the principles of modern therapeutics, to indicate the usefulness of pharmacology in guiding the physician in the selection of his remedies, and the importance of the study of chemical pathology in the treatment of disease by drugs. In my next letter I hope to give some account of the new facts brought out by Dr. Brunton in these lectures.

HYSTERO-EPILEPSY IN THE MALE.

To the Editors of the THERAPEUTIC GAZETTE:

GENTLEMEN:—In compliance with the request of Dr. Cheves Bevill, of Winfield, Ark., I send you for publication the following report of a case of hystero-epilepsy in the male, which came under my observation in September, 1886, the symptoms of which, in the main, resemble those of the case reported by him in the GAZETTE of August 15.

J. S., aged 23, a German, somewhat pale and nervous, and although presenting no symptoms of any appreciable disease, was not as strong and vigorous as might be expected.

On September 14 I was hurriedly called to see him. His friends informed me that he was suddenly taken with a chill and vomiting. I found him exceedingly restless, violently tossing about on the bed; pulse 100; respiration extremely rapid and shallow; face livid and temperature normal. There was present considerable muscular rigidity. He groaned as if in great pain. I gave him a

hypodermic injection of morphine, gr. ¼. In about half an hour he became quiet; respiration and pulse normal. Immediately he seemed to fall into a deep sleep, which lasted about two hours, when he awoke with a wild and vacant stare. He did not have any recollection of what had transpired, but complained of a feeling of oppression in the epigastrium. After an interval of half an hour he again became violently restless, and a repetition of the symptoms already described took place.

This state of affairs continued for five days, the paroxysms, however, becoming less violent and frequent each day.

After the administration of a cathartic, I gave him large doses of bromide of potassium and chloral hydrate, which seemed to have a beneficial effect.

After the cessation of the paroxysms he was completely prostrated, and required nearly two weeks to regain his usual strength.

Since then he has had two or three similar attacks, less violent, and of shorter duration.

The old and erroneous idea that hysteria is dependent entirely on uterine irritation, and consequently necessarily a disease of women only, has been exploded some time ago. It is only peculiar to the female in a greater existing *predisposition*.

Yours truly,

N. McCABE, M.D.

NORTH PLATTE, NEB., September 24, 1889.

THE TREATMENT OF SEWAGE IN LONDON.

To the Editors of the THERAPEUTIC GAZETTE:

GENTLEMEN:—This morning at 10 A.M. Mr. W. I. Dibdin, chemist to the London County Council, met me at the Charing Cross Pier with his steam launch. For many miles below London Bridge we steamed through a much clearer water than that of the Schuylkill at Philadelphia below Fairmount dam, which stream is fast becoming a cesspool. A few minutes before we arrived at Crossness (fourteen miles below London Bridge), the smell of sewage was quite perceptible. At this point the intercepting sewer, for all the Surrey side of London pours its contents, mixed with the rainfall, into the Thames, yet it is robbed of its solid matter, which is precipitated by the mixing of lime and sulphate of iron (four grains of lime, one grain of sulphate of iron to the gallon), and the effluent, as it pours into the Thames, is treated with permanganate of potassium. This is not added in sufficient quantity, owing to the fact that two hundred thousand pounds a year—the sum allowed for the sewage-works of London—is not sufficient to properly treat one hundred and sixty millions of gallons a day. I think you will agree with me when I say this process is the best chemical one in use. One great advantage over the chlorinated lime process is that the micro-organisms are not destroyed, consequently the endless cycle of physical change is not interfered with. The sludge is pumped into vessels, from which it is distributed on the high seas.

The process that you will be particularly interested in, and for which I paid my visit to Crossness, is that accomplished by means of electrolysis. It would seem that this process was first applied by W. W. Webster, F.C.S., who claims for it that it is the most effective and the cheapest manner for separating organic matter and at the same time of disinfecting. It does appear to be a most satisfactory solution of the question of the separation of organic matter in sewage and the rendering the effluent innocuous. The following result is claimed:

	Sewage.	Effluent.
Sulphuretted hydrogen	Present.	None.
Nitrogen as (free) ammonia	1.89	0.83
Nitrogen as organic matter	0.54	0.24
Oxygen required to oxidize organic matter	2.57	1.21
Total suspended matter	15.43	2.28
Total suspended matter, of which mineral	7.43	1.99
Total suspended matter, of which organic	8.00	0.29

The process of obtaining this result at the Crossness Works is about as follows, and is so described by Mr. Webster:

First, starting with the engine-shed. The engine is about twenty-five horse-power, nominal. This pumps the sewage and drives the dynamo. The latter is an Edison-Hopkinson, capable of developing an energy of forty-three horse-power. From the dynamo the loads run through resistance-frames, by means of which the amount of current can be regulated without varying the speed of the engine. These are then connected with the iron electrodes in both the precipitating-tanks and the shoot. The precipitating-tanks are used for taking experimental measurements, so as to discover the best mode of arranging the electrodes or plates made of wrought iron; cast iron would certainly answer the purpose. The shoots are of wood. The sewage is pumped from the sewer into the elevated end of the first shoot. While flowing through the shoot, it comes in contact with the electrodes or plates, which are

arranged parallel to each other, and run longitudinally through the shoot, about two inches apart. It is then directed to the settling-tank, when it separates into sludge and effluent. It is claimed that the current density employed in the shoot is about one ampère per eleven square feet of surface, the total current being about five hundred ampères. The sewage occupies about ten minutes in travelling the full length of the shoot, which is about four hundred feet in length. The total quantity of electricity employed is at the rate of twenty-five ampère-tones per gallon of sewage.

The chemical treatment of sewage in different towns would appear to cost from thirty shillings to seventy shillings per one million gallons, whereas it is calculated that by means of electrolysis it will only cost about twenty shillings per million. The waste of iron at the positive pole is estimated at about 1 gramme per gallon of sewage acted upon. The hypochlorite of iron formed at the positive pole is acted on by the free ammonium, sodium, and potassium, and magnesium hydrates, and the ferrous hydrated oxide precipitated. This oxide of iron has the property of combining with organic matter. It appears to take up more organic matter than if precipitated chemically. The whole of the suspended matter appears to be carried with the iron oxide, together with a large proportion of the organic matter in solution. At first the oxidized matter is carried to the top by the hydrogen gas issuing from the negative pole This flocculent matter, however, soon subsides. If this process proves to be what is claimed for it, the next most important question will be how to dispose of sludge to the best advantage. This from London sewage amounts daily to about three thousand tons.

Yours, faithfully,

SAMUEL G. DIXON,

Professor of Hygiene, University of Pennsylvania.

Notes and Queries.

THE EFFECTS PRODUCED ON MAN BY SUBCUTANEOUS INJECTIONS OF A LIQUID OBTAINED FROM THE TESTICLES OF ANIMALS.

The communications recently made by Dr. Brown-Séquard to the Société de Biologie have attracted so much attention that we reprint in full Dr. Brown-Séquard's communication as published in the *Lancet* for July 20, 1889:

"There is no need of describing at length the great effects produced on the organization of man by castration, when it is made before the adult age. It is particularly well known that eunuchs are characterized by their general debility and their lack of intellectual and physical activity. There is no medical man who does not know also how much the mind and body of men (especially before the spermatic glands have acquired their full power, or when that power is declining in consequence of advanced age) are affected by sexual abuse or by masturbation. Besides, it is well known that seminal losses, arising from any cause, produce a mental and physical debility which is in proportion to their frequency. These facts and many others have led to the generally admitted view that in the seminal fluid, as secreted by the testicles, a substance or several substances exist which, entering the blood by resorption, have a most essential use in giving strength to the nervous system and to other parts. But if what may be called spermatic anæmia leads to that conclusion, the opposite state, which can be named spermatic plethora, gives as strong a testimony in favor of that conclusion. It is known that well-organized men, especially from twenty to thirty-five years of age, who remain absolutely free from sexual intercourse or any other causes of expenditure of seminal fluid, are in a state of excitement, giving them a great, although abnormal, physical and mental excitement. These two series of facts contribute to show what great dynamogenic power is possessed by some substance or substances which our blood owes to the testicles.

"For a great many years I have believed that the weakness of old men depended on two causes,—a natural series of organic changes and the gradually diminishing action of the spermatic glands. In 1869, in a course of lectures at the Paris Faculty of Medicine, discussing the influence possessed by several glands upon the nervous centres, I put forward the idea that if it were possible without danger to inject semen into the blood of old men, we should probably obtain manifestations of increased activity as regards the mental and the various physical powers. Led by this view, I made various experiments on animals at Nahant, near Boston (United States), in 1875. In some of those experiments, made on a dozen male dogs, I tried vainly, except in one case, to engraft certain

parts or the whole body of young guinea-pigs. The success obtained in the exceptional case served to give me great hopes that by a less difficult process I should some day reach my aim. This I have now done. At the end of last year I made on two old male rabbits experiments, which were repeated since on several others, with results leaving no doubt as regards both the innocuity* of the process used and the good effects produced in all those animals. This having been ascertained, I resolved to make experiments on myself, which I thought would be far more decisive on man than on animals. The event has proved the correctness of that idea.

"Leaving aside for future researches the questions relating to the substance or substances which, being formed by the testicles, give power to the nervous centres and other parts, I have made use, in subcutaneous injections, of a liquid containing a small quantity of water mixed with the three following parts: first, blood of the testicular veins;† secondly, semen; and, thirdly, juice extracted from a testicle, crushed immediately after it has been taken from a dog or a guinea-pig. Wishing in all the injections made on myself to obtain the maximum of effects, I have employed as little water as I could. To the three kinds of substances I have just named I added distilled water in a quantity which never exceeded three or four times their volume. The crushing was always done after the addition of water. When filtered through a paper filter, the liquid was of a reddish hue and rather opaque, while it was almost perfectly clear and transparent when Pasteur's filter was employed. For each injection I have used one cubic centimetre of the filtered liquid. The animals employed were a strong and, according to all appearances, perfectly healthy dog (from two to three years old), and a number of very young or adult guinea-pigs. The experiments, so far, do not allow of a positive conclusion as regards the relative power of the liquid obtained from a dog and that drawn from guinea-pigs. All I can assert is that the two kinds of animals have given a liquid endowed with very great power. I have hitherto made ten subcutaneous injections of such a liquid—two in my left arm, all the others in my lower limbs—from May 15 to June 4 last. The first five injections were made on three succeeding days with a liquid obtained from a dog. In all the subsequent injections, made on May 24, 29, and 30, and June 4, the liquid used came from guinea-pigs. When I employed liquids having passed through Pasteur's filter, the pains and other bad effects were somewhat less than when a paper filter was used.

"Coming now to the favorable effects of these injections, I beg to be excused for speaking so much as I shall do of my own person. I hope it will easily be understood that, if my demonstration has any value—I will even say any significance—it is owing to the details concerning the state of my health, strength, and habits previously to my experiments, and to the effects they have produced.

"I am seventy-two years old. My general strength, which has been considerable, has notably and gradually diminished during the last ten or twelve years. Before May 15 last I was so weak that I was always compelled to sit down after half an hour's work in the laboratory. Even when I remained seated all the time, or almost all the time, in the laboratory, I used to come out of it quite exhausted after three or four hours' experimental labor, and sometimes after only two hours. For many years, on returning home in a carriage by six o'clock after several hours passed in the laboratory, I was so extremely tired that I invariably had to go to bed after having hastily taken a very small amount of food. Very frequently the exhaustion was so great that, although extremely sleepy, I could not for hours go to sleep, and I only slept very little, waking up exceedingly tired.‡

"The day after the first subcutaneous injection, and still more after the two succeeding ones, a radical change took place in me, and I had ample reason to say and to write that I had regained at least all the strength I possessed a good many years ago. Considerable

* "This innocuity was also proved on a very old dog by twenty subcutaneous injections of a fluid similar to that I intended to employ on myself. No apparent harm resulted from these trials, which were made by my assistant, Dr. d'Arsonval."

† "For reasons I have given in many lectures in 1869 and since, I consider the spermatic as also the principal glands (kidneys, liver, etc.) as endowed, besides their secretory power, with an influence over the composition of blood, such as is possessed by the spleen, the thyroid, etc. Led by that view, I have already made some trials with the blood returning from the testicles. But what I have seen is not sufficiently decisive to be mentioned here."

‡ "I ought to say that, notwithstanding that dark picture, my general health is and has been almost always good, and that I had very little to complain of, excepting merycism and muscular rheumatism."

laboratory work hardly tired me. To the great astonishment of my two principal assistants, Drs. d'Arsonval and Hénocque, and other persons, I was able to make experiments for several hours while standing up, feeling no need whatever to sit down. Still more: one day (the 23d of May), after three hours and a quarter of hard experimental labor in the standing attitude, I went home so little tired that after dinner I was able to go to work and to write for an hour and a half a part of a paper on a difficult subject. For more than twenty years I had never been able to do as much.* From a natural impetuosity, and also to avoid losing time, I had, till I was sixty years old, the habit of ascending and descending stairs so rapidly that my movements were rather those of running than of walking. This had gradually changed, and I had come to move slowly up and down stairs, having to hold the banister in difficult staircases. After the second injection I found that I had fully regained my old powers, and returned to my previous habits in that respect.

"My limbs, tested with a dynamometer, for a week before my trial and during the month following the first injection, showed a decided gain of strength. The average number of kilogrammes moved by the flexors of the right forearm, before the first injection, was about thirty-four and a half (from thirty-two to thirty-seven), and after that injection forty-one (from thirty-nine to forty-four), the gain being from six to seven kilogrammes. In that respect the forearm flexors reacquired, in a great measure, the strength they had when I was living in London (more than twenty-six years ago). The average number of kilogrammes moved by those muscles in London in 1863† was forty-three (forty to forty-six kilogrammes).

"I have measured comparatively, before and after the first injection, the jet of urine in similar circumstances,—*i.e.*, after a meal in which I had taken food and drink of the same kind in similar quantity. The average length of the jet during the ten days that preceded the first injection was inferior by at least one-quarter of what it came to be during the twenty following days. It is, therefore, quite evident that the power of the spinal cord over the bladder was considerably increased.

"One of the most troublesome miseries of advanced life consists in the diminution of the power of defecation. To avoid repeating the details I have elsewhere given in that respect, I will simply say that after the first days of my experiments I have had a greater improvement with regard to the expulsion of fæcal matters than in any other function. In fact, a radical change took place, and even on days of great constipation the power I long ago possessed had returned.

"With regard to the facility of intellectual labor, which had diminished within the last few years, a return to my previous ordinary condition became quite manifest during and after the first two or three days of my experiments.

"It is evident from these facts and from some others that all the functions depending on the power of action of the nervous centres, and especially of the spinal cord, were notably and rapidly improved by the injections I have used. The last of these injections was made on June 4, about five weeks and a half ago. I ceased making use of them for the purpose of ascertaining how long their good effects would last. For four weeks no marked change occurred, but gradually, although rapidly, from the 3d of this month (July) I have witnessed almost a complete return of the state of weakness which existed before the first injection. This loss of strength is an excellent counterproof as regards the demonstration of the influence exerted on me by the subcutaneous injections of a spermatic fluid.

"My first communication to the Paris Biological Society was made with the wish that other medical men advanced in life would make on themselves experiments similar to mine, so as to ascertain, as I then stated, if the effects I had observed depended or not on any special idiosyncrasy or on a kind of auto-suggestion without hypnotization, due to the conviction which I had before experimenting that I should surely obtain a great part at least of these effects. This last supposition found some ground in many of the facts

* "My friends know that, owing to certain circumstances and certain habits, I have for thirty or forty years gone to bed very early and done my writing work in the morning, beginning it generally between three and four o'clock. For a great many years I had lost all power of doing any serious mental work after dinner. Since my first subcutaneous injections I have very frequently been able to do such work for two, three, and one evening for nearly four hours."

† "I have a record of the strength of my forearm, begun in March, 1860, when I first established myself in London. From that time to 1862 I occasionally moved as much as fifty kilogrammes. During the last three years the maximum moved was thirty-eight kilogrammes. This year, previously to the first injection, the maximum was thirty-seven kilogrammes. Since the injection it has been forty-four."

contained in the valuable and learned work of Dr. Hack Tuke on the "Influence of the Mind over the Body." Ready as I was to make on my own person experiments which, if they were not dangerous, were at least exceedingly painful, I refused absolutely to yield to the wishes of many people anxious to obtain the effects I had observed on myself. But, without asking my advice, Dr. Variot, a physician who believed that the subcutaneous injections of considerably diluted spermatic fluid* could do no harm, has made a trial of that method on three old men,—one 54, another 56, and the third 68 years old.† On each of them the effects have been found to be very nearly the same as those I have obtained on myself. Dr. Variot made use of the testicles of rabbits and guinea-pigs.

"These facts clearly show that it was not to a peculiar idiosyncrasy of mine that the effects I have pointed out were due. As regards the explanation of those effects by an auto-suggestion, it is hardly possible to accept it in the case of the patients treated by Dr. Variot. They had no idea of what was being done; they knew nothing of my experiments, and were only told that they were receiving *fortifying* injections. To find out if this qualification had anything to do with the effects produced, Dr. Variot, since the publication of his paper, has employed similar words of encouragement, while making subcutaneous injections of pure water on two other patients, who obtained thereby no strengthening effect whatever.‡

"I believe that, after the results of Dr. Variot's trials, it is hardly possible to explain the effects I have observed on myself otherwise than by admitting that the liquid injected possesses the power of increasing the strength of many parts of the human organism. I need hardly say that those effects cannot have been due to structural changes, and that they resulted only from nutritive modifications, perhaps in a very great measure from purely dynamical influences exerted by some of the principles contained in the injected fluid.

"I have at present no fact to mention which might serve to solve the question whether it would be possible or not to change structurally muscles, nerves, and the nervous centres by making during a good many months frequent injections of the fluid I have used. As I stated at the Paris Biological Society, I have always feared, and I still fear, that the special nutritive actions which bring on certain changes in man and animals, from the primitive embryonal state till death by old age, are absolutely fatal and irreversible. But in the same way that we see muscles which have from disease undergone considerable structural alterations regain sometimes their normal organization, we may, I believe, see also some structural changes not essentially allied with old age, although accompanying it, disappear to such a degree as to allow tissues to recover the power they possessed at a much less advanced age.

"Whatever may be thought of these speculations, the results I have obtained by experiments on myself and those which have been observed by Dr. Variot on three old men show that this important subject should be further investigated experimentally."

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*"In my third communication at the Biological Society, I said that both the intense pain each injection has caused me and the inflammation it has produced would be notably diminished if the liquid employed were more diluted. The three cases of Dr. Variot have proved the exactitude of my statement. He made use of a much larger amount of water, and his patients had to suffer no very great pain and no inflammation."

†"The paper of Dr. Variot and my remarks upon it have appeared in the *Comptes-Rendus de la Société de Biologie*, No. 26, 5 Juillet, 1889, pp. 451 and 454."

‡"Since writing the above I have received a letter from Dr. Variot announcing that, after injecting the liquid drawn from the testicles into these two individuals, he has obtained the same strengthening effects I have myself experienced."

STERILIZING MILK.

The question of sterilizing milk is one of special importance in relation to the well-being of children, to whom this commodity forms the staple food, especially during the hot days of summer. The process can be readily carried out without putting the householder to the expense of purchasing some special sterilizing apparatus. All that is necessary is to obtain some bottles capable of containing the milk which will be consumed during the day, each bottle being large enough to hold the quantity which will be used at one time. Absolute cleanliness being an essential feature in this particular, these bottles and their corks should be thoroughly sterilized by being boiled in a solution of washing soda. When the milk is brought to the house it should be placed in bottles, the latter afterwards being arranged on a wire frame in a pot of water and then boiled for fifteen minutes. The bottles should then be immediately securely corked and placed in a refrigerator with the ice upon them.

These small details are perfectly simple and could be readily carried out, if only the nurse or the parent could be made to appreciate the necessity of giving children milk which is free from "germ"-life. But the effect of sterilizing milk, if it became a routine process in family households, would be of course of great service in affording protection against scarlet fever, typhoid fever, and other diseases whose propagation by means of milk under certain circumstances has been known to occur.—*Medical Press*, August 7, 1889.

POISONING BY POTATOES.

In the *Journal de Médecine et de Chirurgie Pratiques* for August, 1889, DR. CORTIAL gives an account of serious symptoms of poisoning which occurred in one hundred and one members of a battalion of infantry. The symptoms were headache, dilatation of the pupils, colic, diarrhœa, sweating, fever, pain in the epigastrium, vertigo, nausea, thirst, troubles of vision, and cramps.

The poison was evidently contained in the food, and, after successive eliminations, suspicion rested upon the potatoes, which were withheld for forty-eight hours, with the result that no new cases developed. It was found on examination that the potatoes simply consisted of sprouts, which, as is well known, contain solanine, an alkaloid of a poisonous character, and which produces results similar to those detailed above.

In these cases the average duration of the indisposition was four to five days, although in some it lasted somewhat longer, with persistence of the diarrhœa. As the cause of the affection was not recognized, and the effects did not appear until eight or ten hours after the meal, it was too late for evacuating medicine, and ether and laudanum were given, and the patients confined to a milk diet.

INCUBATION PERIOD OF MEASLES.

M. H. LEROUX (*La France Médicale*, No. 89) relates cases of measles in which it was fairly evident that the usual period of incubation (twelve to fourteen days) had been exceeded. In one case a child, aged 7 years, who was sent into the country the day following the appearance of the rash on his sister, developed the rash himself twenty days later. In another a school-girl, while suffering from an attack of scarlatina was also incubating measles. For the scarlatina developed on March 29; the fever declined on April 10; but on the 14th she again complained of sore throat, had coryza, etc., and on the 15th showed measles rash. She had been separated from her school-fellows for nineteen days, and either the measles had an incubation period of at least this duration, or it must have been conveyed to her while suffering from scarlet fever. The third case was one of a boy of 8 years, who had been isolated from a younger sister suffering from measles, and who did not exhibit the rash himself until twenty days afterwards. Of course in each case the contagion might have been conveyed by a third person, but M. Leroux is perfectly satisfied that this did not take place. The second case is remarkable as an instance of concurrence of two specific infective disorders.—*Lancet*, August 17, 1889.

THE CONSTITUENTS OF THE JUICE OF ANTIARIS TOXICARIA.

The milky juice of *Antiaris toxicaria*, used as arrow-poison in the East Indian Archipelago, contains, according to H. W. BETTINK, at least three active principles, which seem to be closely allied to each other (*Ned. Tijdschr. v. Pharm.*). The most important of these, antiarine ($C_{14}H_{20}O_{50}$), is precipitated from its solutions by tannin, but only in a state of indissoluble combination with other substances. When the dried juice has been treated with petroleum ether or benzole, the resin, the fat, and the india-rubber-like portion removed, and the residue extracted by alcohol, a thick fluid remains, from which the antiarine separates in the form of crystals. These represent about 1.7 per cent. of the dry, or .6 per cent. of the fresh, juice. According to Tichmann, they belong to the rhombic system. By sulphuric acid they are colored light brown and decomposed. Dogs and rabbits are killed in a few minutes by a dose of ½ milligramme injected into the blood. The second constituent is obtained from the same syrupy mass or mother-liquid, by drying it on a water-bath, letting it stand for twenty-four hours, and then stirring it up with small quantities of water, during which process more of the antiarine crystals will be separated. After they have ceased to form, a substance may be thrown down by diluting the mother-liquid with water, and adding a solution of tannin. This substance, for which the name œpäin has been proposed, very closely resembles antiarine in its physiological effects, and gives the same reactions with acids, but differs in being very soluble

in water and in its behavior towards tannin. The third constituent of the juice—also non-crystallizable, easily soluble in water and alcohol, but not precipitated by tannin—is called toxicarine. The author promises further communications upon the subject.—*Druggists' Circular*, September, 1889.

THE FIRST SOUND OF THE HEART.

The part recently issued of the *Archiv für Anatomie und Physiologie* contains a paper by Dr. Ludolf Krehl, in which, from investigations conducted in the Physiological Institute of Leipsic, he has arrived at the conclusion that the contraction of the cardiac muscular fibres is the principal cause of the first sound, instead of being, as is now generally admitted, merely an accessory cause, or, as some will have it, entirely inoperative. The part played by each of these factors in the production of the sound can only be finally determined when the intensity of the full sound is ascertained, as well as the intensity of the several possible factors. But the difficulties of the case are well known; for while, on the one hand, the systole of the heart is found to consist of a single and sudden contraction, which it is held can produce no sound, since it produces only a single wave, and while it is rendered indistinct by the incompetency of the auriculo-ventricular valves; on the other hand, such experienced observers as Ludwig and Dogiel have satisfied themselves that under circumstances in which the sudden tension both of the auriculo-ventricular valves and of the vascular walls is impossible, the first sound is still indubitably inaudible, from which it would appear that one, if not the chief, agent in its production is the muscular sound. The researches of Krehl were undertaken to test the truth of Ludwig and Dogiel's observations under conditions in which the play of the valves was still more stringently prevented, and this he believes he has accomplished by the employment of an ingeniously-constructed little apparatus, consisting of a tube, from the extremity of which an expanding crown can be protruded, and by this means, when the instrument is introduced into the cavity of the heart, the valves can be firmly pressed back against the walls of the arteries. The animals used were dogs, and while after the insertion of the instrument one observer auscultated the heart, another alternately pressed in and withdrew the crown. The results obtained were that when the auscultator knew that the crown was thrust out and the valves compressed against the arterial walls, he perceived that the systolic sound was duller and a little less strong; but when with averted face he was unaware of the position of the crown, he was unable to distinguish any difference between the periods when the valves were acting and when they were not acting. This result obtained incidental confirmation by the fact that in all instances as the animals bled to death the second sound disappeared, while the first sound was still for some time distinctly audible; and additional evidence is to be found in the circumstance that, when in such cases the ventricle had ceased to contract and the auricle alone acted, a sound was clearly perceptible,—that is, when the play of the valves had certainly ceased. He does not consider that he has been able to determine from his investigations whether the cardiac contraction is a simple convulsion or a tetanus, but he thinks that the sound may arise from the friction of the muscular fibres against each other; and this is supported by the observation of Dr. MacWilliam, that a sound is audible on simple convulsion or spasm of the voluntary muscles.—*Lancet*, August 24, 1889.

SOME NEW DRUGS.

Naregamia Alata.—This new drug, described for the first time by Hooker, has for some time been largely employed in the General Hospital in Vienna. The active principle was discovered by Hooker, and by him named naregamine. It is an alkaloid which forms crystallized salts, with sulphuric, nitric, and hydrochloric acids. In addition to this alkaloid the bark of the rhizome contains wax, gum, asparagine, starch, but no tannin.

The natives on the coast of Malabar, where this plant is indigenous, employ it as an emetic, and as a remedy in bilious conditions, rheumatism, and digestive disorders. It has likewise been recommended in dysentery and in bronchial catarrh. In the General Hospital at Vienna this remedy is employed under the form of a fluid extract, or it may be given in the form of pills or of tincture. The dose of the fluid extract is stated to be from 30 to 50 drops, in water flavored with laurel-water.

Xanthoxylon Senegalense (artar-root).—Giacose and Soave have found four alkaloids in the bark of this plant, one of which, artarine, closely resembles berberine in constitution. —*Les Nouveaux Remèdes*, July 24, 1889.